

**50<sup>th</sup>**

**Anniversary  
Issue  
1910  
1960**

# **COMMERCIAL FERTILIZER**

**AND PLANT FOOD INDUSTRY**

**AUGUST  
1960**

**ARE YOU SURE  
YOU USE THE  
RIGHT SOLUTION?**

**SEE PAGE 19**

*sleek...  
trim...  
and perfectly coordinated!*



That's our new 300,000 sq. ft. multiwall bag plant at St. Marys, Ga.

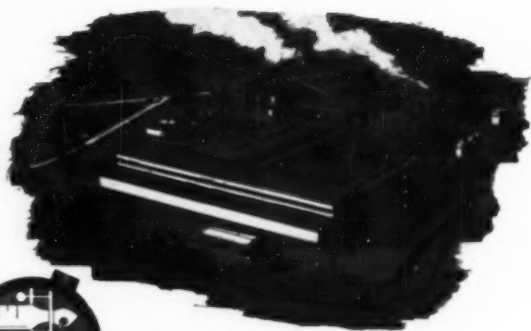


Like the building itself, our equipment is new and the very latest in mechanical efficiency.

This fully integrated plant has every facility for turning out every kind of multiwall bag ... open mouth or valve, sewn or pasted, stepped-end, and our own patented Kraft-lok® valve; also bags with special inserts, sleeves, protective linings or outers, and vapor barriers.

The best in multiwall bags—are Kraft Bags!

... and the best in open mouth bag filling machines is *The Kraftpacker*, for which we are exclusive sales agents.



Paper Mill at St. Marys, Ga.



## KRAFT BAG CORPORATION

Gilman Paper Company Subsidiary

630 Fifth Avenue, New York 20, N. Y.

Daily News Building, Chicago 6, Ill.

☐ We would like to know more about Kraft Bag Multiwalls.

☐ We would like to know more about The Kraftpacker.

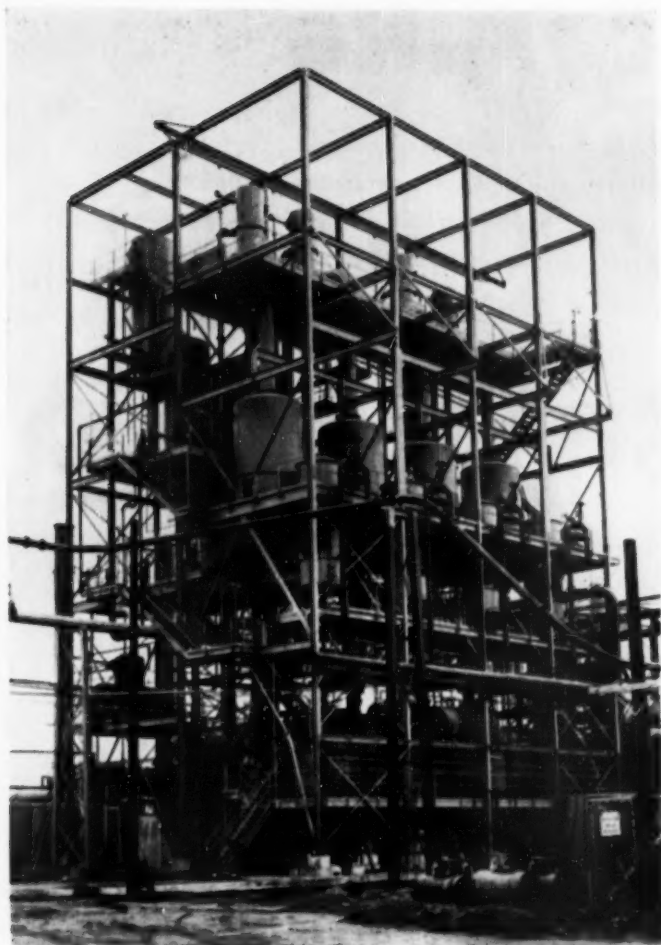
COMPANY NAME \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

PRINCIPAL \_\_\_\_\_

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**SUPERPHOSPHATE**

**TRIPLE SUPERPHOSPHATE**

**AMMONIA**

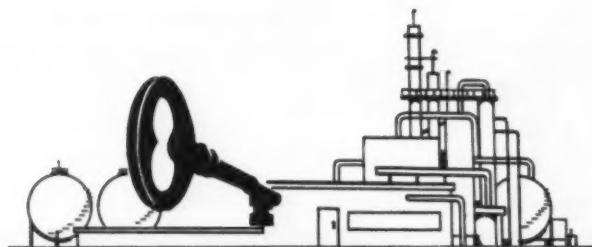
**AMMONIUM NITRATE**

**MIXED FERTILIZER**

**PHOSPHORIC ACID**

**SULPHURIC ACID**

**GRANULATION**



**WML** **WELLMAN-LORD**  
**ENGINEERING INC.**

P.O. BOX 2436 LAKELAND, FLORIDA

# WE SAW IT COMING

Three years ago in the August issue of Commercial Fertilizer Magazine we showed the economy of ammonium phosphate plants. Said this announcement "an entirely new phase of fertilizer production and selling has been created" by the Weatherly Di-Map Process.

## WE DEVELOPED **DI-MAP**

This Weatherly process has made it good sense and sound economics to build Di-Map fertilizer plants of any needed size, from small to large, with low capital investment, low production cost and premium goods.

## WE'VE BEEN BUILDING AMMONIUM PHOSPHATE PLANTS FOR 3 YEARS NOW



OUR  
PLANTS  
PURR  
LIKE  
KITTENS

These Weatherly plants make sense because they have high operating factors; low ammonia loss; granulation controlled as close as through 7 on 9 mesh; production at the rate you choose, from 25,000 tons up. And we guarantee uniformity, production rate—and a plant that suffers a minimum of start-up pains. As we keep saying, our plants purr like kittens. This would be a good time to talk about it. Why not?

# The D. M. WEATHERLY COMPANY

*Industrial Engineers and Builders*

80 Eleventh St., N.E., Atlanta, Georgia Phone: TRinity 5-7986



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## COMMENTING FREELY

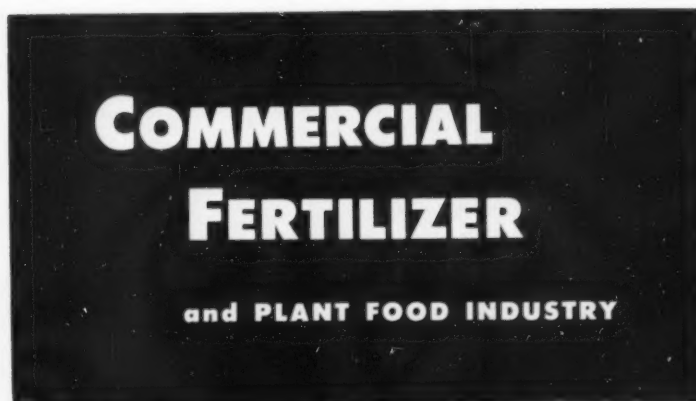
by  
**Bruce Moran**

The report in our International Scene department this month concerning the basic damage being done to the agriculture of Cuba is a phase often overlooked in discussions of that unhappy land. Naturally enough the problems of people and of industry there come first. But in the long run there can be no worse form of mis-management than that which destroys the work of generations in building up the soil.

This is dramatized by the Cuban situation. In less visible form it happens here — and wherever in the world the land is drained of plant food without replenishment. This invisible erosion may not so promptly punish those who cause it. But in the long run land gets its revenge for neglect and misuse.

We can understand the inability of a marginal farmer to buy fertilizer. We can thoroughly understand those who say the marginal farmer has no business remaining on his own farm. We know the inexorable working of economics will clear up this picture . . . but we sincerely grieve over the damage done to land that soon will be urgently needed to feed the exploding population of the world.

August, 1960



Vol. 101, No. 2

August, 1960

Established 1910

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Phosphate Products for High Analysis Formulations!



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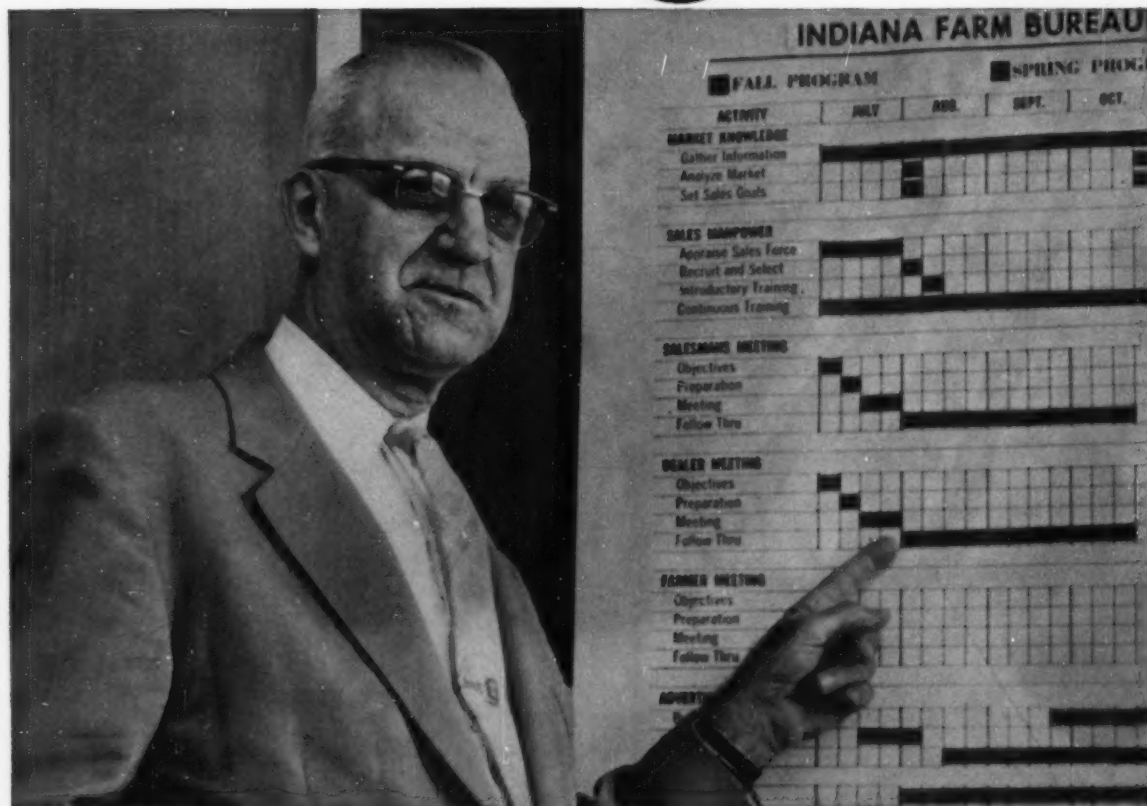
**U.S. PHOSPHORIC PRODUCTS**  
TAMPA, FLORIDA

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CORPORATION

# "Progress



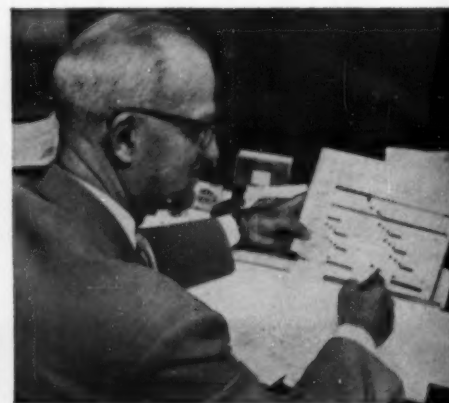
A. R. Mullin, fertilizer department manager, uses "Planalyzer" wall chart to coordinate everyone's work.



Mullin and Indiana Farm Bureau production manager Melvin Leach collect and interpret selling and marketing information . . . schedule additional conferences.



Well-organized sales meetings such as this were made possible through proper preparation and sufficient lead time.



Indiana Farm Bureau's fiscal year, efficiently organized and on paper, hustles projects through the works in an orderly fashion.



# on Paper"

## *That's what many users call IMC's Planalyzer*

**This marketing aid coordinates planning of sales activities for better business management . . . here's how one fertilizer marketing team used it to advantage.**

The story began late in 1958 when the manager of the Indiana Farm Bureau fertilizer department, Mr. Arthur R. Mullin, and IMC representative Mr. George Urbanis discussed the fertilizer sales outlook for the coming year.

Urbanis introduced Mullin to a newly developed IMC marketing tool called the "Planalyzer" . . . a practical visual planning calendar specially tailored to fertilizer marketing.

### **Mullin called a planning meeting**

with his production, field service and advertising managers. Using the "Planalyzer" forms they

blocked out sales seasons. Market research was scheduled. Next activities and promotion were planned to make the most of the selling season. Field sales meetings were scheduled. Purchasing, warehousing and manufacturing activities were geared to mesh with all other fertilizer department operations. Then after "Planalyzer" forms were completed, they were mailed to IMC for enlargement into a wall chart.

### **"Best program we ever had!"**

At the end of the year Mullin stated, "We've always had a program, but this year it was on paper and organized. The "Planalyzer" helped coordinate everyone's work . . . encouraged planning and project scheduling. It also helped build a realistic sales goal. We had enough lead time so we didn't get into crash programs."

AGRICULTURAL CHEMICALS DIVISION

**INTERNATIONAL MINERALS & CHEMICAL CORPORATION**



ADMINISTRATIVE CENTER, OLD ORCHARD ROAD, SKOKIE, ILLINOIS, ORCHARD 8-3000

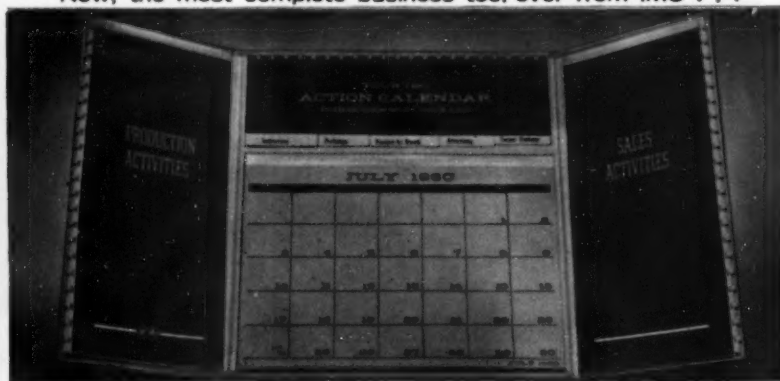
PRODUCTS FOR GROWTH<sup>®</sup>

<sup>®</sup>TRADEMARK

Now, the most complete business tool ever from IMC . . .



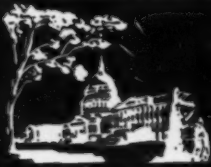
Indiana Farm Bureau's advertising manager, Eugene Holcombe, and his art director develop a solid campaign — in plenty of time — that helps spark successful selling.



**NEW IMC ACTION CALENDAR** — a bigger, more comprehensive marketing and production tool for the 1960-61 sales season. It distills successful experiences of dozens of fertilizer manufacturers into an effective, new IMC Full-Orbit Service. In addition to market research, advertising and other promotion, the ACTION CALENDAR blankets all fertilizer manufacturing and technical activities. Your IMC representative will call on you soon to introduce the new ACTION CALENDAR to you and your staff.

FO-1-01





## JUST AROUND THE CORNER

By Vernon Mount



YOUTH is obviously the foundation of the 1960 presidential election campaign. Both major contenders are under 50, which is young as presidents come and go. Both have developed a young following...the Republicans put great emphasis on bringing in young, new blood as far back as the 1952 campaign - and it served them well.

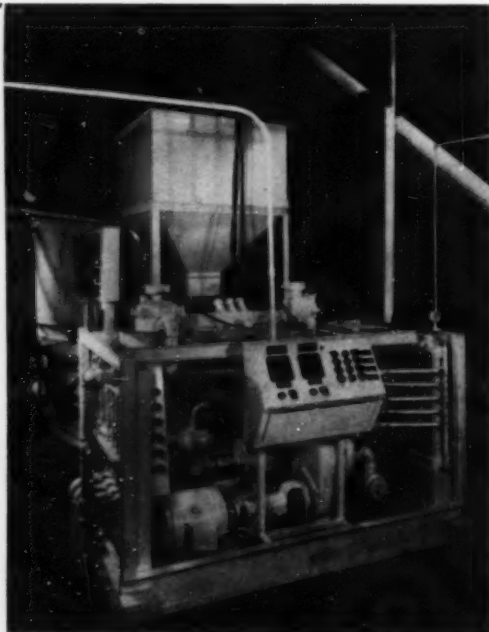
A LOGICAL campaign appeal on both sides, this Youth angle says the old-timers have made a mess, and it's time to give the youngsters a crack at the problems of the world situation.

NEW FACES are appearing and will appear throughout the Government, no matter which party wins. You can be sure of that. And while us old timers may cringe a little, and bite our nails some - we might as well relax and watch. After all, youth is and always has been the source of progress, with age watching to catch them when they stumble!

Yours faithfully

*Vernon Mount*

### LIQUID FERTILIZER UNIT



Manufacturing and blending unit offers one-man operation, automatic controls, continuous operation. Also available in smaller size at lower cost. For details contact

**Standard Steel Manufacturing Co.**  
2137 N. Sherman Dr., Indianapolis 18, Ind.

### 'Perrin Model' Soil Sampler



←**STANDARD SOIL AUGER**  
Our regular type 'Perrin Model' used for general soil sampling in ordinary type soils. Exclusive Bit designed for easy penetration.

All heads pictured at left are available on a one-piece non-extendable "T" handle.

←**FOR MUD TYPE SOIL**  
Designed for easy extraction of mud or clay sample. Same easy penetrating bits as our standard auger.

Extendable augers up to 30 ft are easily handled by one person.

←**FOR SANDY TYPE SOIL**  
Designed especially for use in extreme types of sandy soils. Built to retain sample of dry sand.

A complete set—three augers with a "T" handle and extendable shaft.

Manufactured and  
distributed by

write for complete  
price list and  
descriptive literature

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American Falls, Idaho

Exclusive manufacturers of 'Perrin Model' Soil Sampling Auger  
There's No Substitute for Quality



## 41 plants...for prompt delivery of AA quality products

41 plants of The A.A.C. Co., located in the United States, Cuba and Canada, assure you dependable, fast deliveries of AA quality products for farm and industry. You can schedule your production with confidence... the right quantity and grade will be at your plant when you need it.

*for uniform quality, prompt delivery  
and technical service... order from*

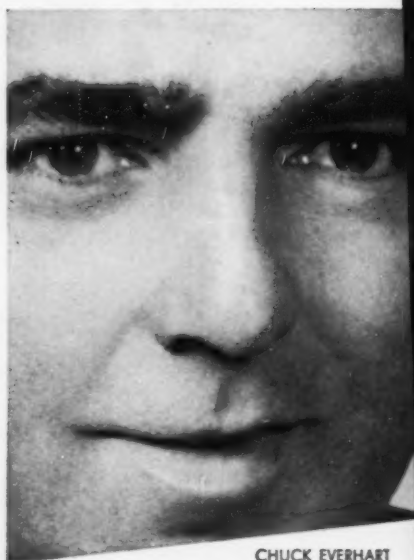
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### producers of:

Florida Pebble Phosphate Rock • Superphosphate  
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Sulphuric Acid • Phosphoric Acid and Phosphates  
Phosphorus and Compounds of Phosphorus





CHUCK EVERHART

**These men  
help you get  
the most  
  
...from  
U.S.I. fertilizer  
raw materials**



TOM MARTIN

There's nothing more impersonal than a tank car sitting on a siding. But if it's a U.S.I. shipment on your siding, you'll find there's nothing impersonal about the service behind the U.S.I. oval. One call can bring a U.S.I. Technical Service Man to your plant . . . promptly. It may be Tom Martin, for instance, or Charles (Chuck) Everhart.

Chances are you know Tom, U.S.I.'s senior field service engineer in your area. Just about every fertilizer manufacturer does, since Tom's an oldtimer in the business . . . was a fertilizer plant manager himself. Tom knows our products . . . knows your products as well . . . combines this knowledge to your benefit.

Chuck is a long-time fertilizer man too . . . was also a fertilizer plant manager before coming to U.S.I. Chuck is an outgoing guy who likes people, likes working with them on their problems. And there are few problems in the fertilizer field he hasn't tackled at some time.

Tom and Chuck's definition of technical service is as broad as their experience. They'll help on shipping, equipment, unloading and storage problems, any aspect of production involving our chemicals—formulations, equipment recommendations, methods, start-up runs, costs. There's nothing cut-and-dried about their approach either. You'll find they'll listen to your slant on things . . . will be glad to exchange ideas with you.

These men work for you more than they work for us. Try them out if you have any problems on your next shipment of fertilizer raw materials—ammonia, nitrogen solutions, sulfuric or phosphoric acid.



**INDUSTRIAL CHEMICALS CO.**

Division of National Distillers and Chemical Corp.  
99 Park Ave., New York 16, N. Y.  
Branches in Principal Cities

**AMMONIA • NITROGEN SOLUTIONS • SULFURIC ACID • PHOSPHORIC ACID**

*last year more than 150  
multiwall users reduced  
their packaging costs  
thru UNION-CAMP'S*

# BAG CONSTRUCTION



*another FREE service of the ★ 5 Star Packaging Efficiency Plan!*

How much could you save through UNION-CAMP'S 5-Star Packaging Efficiency Plan? Look at the record. Last year a single feature of this unusual service—bag construction—helped over 150 companies cut their multiwall costs. By tens of thousands of dollars!

Improved bag construction lowered the basis weight of a southern packer's multiwalls by 10 per cent. He netted \$30,000 as a result. Another firm saved \$42,000. A third, following UNION-CAMP'S recommendations for a new, stronger closure, largely eliminated breakage and netted packaging economies totaling \$4.05 per M.

In addition to bag construction this comprehensive

packaging program offers you four other important services. Bag design. Specifications control. Packaging machinery analysis. A survey of your plant. And it's free—regardless of the brand of multiwalls you now use.

Why not take advantage of it now by getting in touch with your local UNION-CAMP man?



**UNION-CAMP®**

MULTIWALL BAGS

Union Bag-Camp Paper Corporation, 233 Broadway N.Y. 7, N.Y.

★ BAG DESIGN · BAG CONSTRUCTION · SPECIFICATIONS CONTROL · PACKAGING MACHINERY · PLANT SURVEY

August, 1960

13



Cauliflower: left, boron-treated; right, brown curd with boron deficiency



Alfalfa yellows and rosetting due to boron deficiency

EXAMPLES OF BORON DEFICIENT CROPS



Apples with external cork cracks, necrotic areas and dwarfed



Tobacco with die-back of terminal bud rolling of upper leaves

Choose  
the most **ECONOMICAL**  
**SOURCE of BORON**  
for your requirements...

If your need is this 

- **MIXED FERTILIZERS**
  1. Complete Fertilizers
  2. Granulated Fertilizers
  3. Granular Blends

- **LIQUID FERTILIZERS**  
or  
■ **FOLIAGE APPLICATIONS**

Team up with this 

- **FERTILIZER BORATE-65 Concentrated**  
or  
■ **FERTILIZER BORATE-46 High Grade**
- **SOLUBOR® (POLYBOR-2)®**  
or  
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# DRI-SOL

## ADVANCED, NEW NITROGEN SOLUTIONS

developed by Commercial Solvents Corporation



It's a pleasure to tell you about the new, exclusive (patents pending) DRI-SOL Nitrogen Solutions. This new line represents a significant advancement in ammoniating solutions. In making mixed fertilizers, you will find the performance of these solutions quite impressive. You can count on at least 7 distinct benefits:

1. Reduced shipping costs.
2. Better process control in continuous ammoniation.
3. Lower formulation costs.
4. Lower drying costs, increased
- dryer capacity, or a drier product.
5. Increased plant capacity.
6. Faster curing and quicker shipment.
7. Improved quality of both conventional and granular fertilizer.

In addition to these 7 advantages, you may find still other ways in which these unique DRI-SOL solutions can be useful to you. For example, these solutions can be used to help offset the high water content of low strength acid, or to produce those grades which are difficult or impossible to

make with conventional solutions. CSC's DRI-SOL Nitrogen Solutions are available in grades ranging from 24% ammonia and 16% ammonium nitrate to equal parts by weight of ammonia and ammonium nitrate. This new line of solutions is essentially anhydrous. Water content: about 0.5%.

DRI-SOL solutions are generally available in the Southern and Midwestern States. Technical literature available to fertilizer manufacturers.

AGRICULTURAL CHEMICALS DEPARTMENT

**COMMERCIAL SOLVENTS CORPORATION** **CSC**

260 Madison Avenue, New York 16, N. Y.

★ Please send me technical data on CSC's new DRI-SOL Nitrogen Solutions. The solutions numbers I am currently using are: \_\_\_\_\_

The bulk of my mixed goods tonnage is made up in the following grades: \_\_\_\_\_

NAME \_\_\_\_\_  
TITLE \_\_\_\_\_  
COMPANY \_\_\_\_\_  
STREET \_\_\_\_\_  
CITY \_\_\_\_\_ ZONE \_\_\_\_\_  
STATE \_\_\_\_\_

ELEMENTARY...IT'S A



MULTIWALL BAG...  
THAT'S WHY IT  
DIDN'T BREAK!



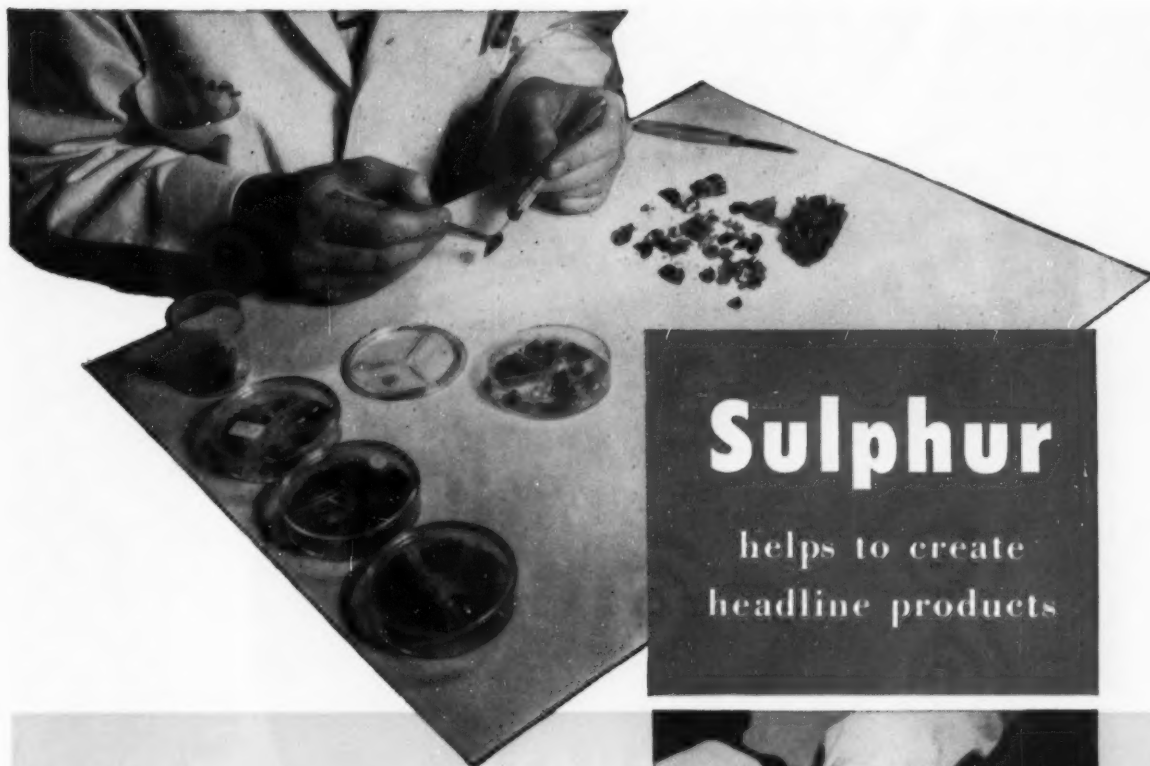
New CLUPAK extensible paper makes other papers old-fashioned . . . makes multiwall bags that stretch to take strain . . . absorb shock that causes bag damage. This increased toughness allows multiwall sack users to increase strength yet decrease the number of plies with resulting economies. Specify CLUPAK extensible paper multiwalls the next time you order.



You benefit three ways. One, you eliminate burst-bag waste, because CLUPAK extensible paper absorbs shock . . . stretches instead of tearing. Two, you increase storage efficiency. CLUPAK extensible paper permits safe, clean, more compact stacking, less re-stacking. Third, you simplify on-the-job handling. Your workmen do not have to "baby" multiwalls made with CLUPAK extensible paper. The next time you order, say, "CLUPAK" . . . before you say paper.



\*Clupak, Inc.'s trademark for extensible paper manufactured under its authority and satisfying its specifications. Clupak, Inc., 530 5th Ave., N. Y. 36, N. Y.

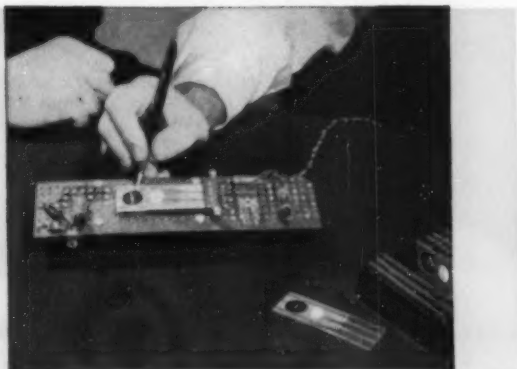


# Sulphur

helps to create  
headline products

## CdS

... a new concept  
in field-effect  
transistor design



General Motors Research Laboratories has recently announced the application of a new transistor material ... the cadmium sulphide crystal which offers several distinctive values over the single type atomic material. Its outstanding characteristic is that it is controllably sensitive to and affected by light and other radiations.

CdS provides another interesting development where Sulphur is importantly in the picture ... a development that may have far-reaching effects in the broad field of electronics.

**Sulphur** and its many derivatives, either directly or indirectly, have a part in the creation of countless products, adding to the strength of our economy. Our business is to produce Sulphur—molten as well as solid—and have it available in sufficient tonnages at several departure points to serve any plant in the United States or Canada. Supplementing this basic policy, we are developing centralized distribution centers for quicker service.



## TEXAS GULF SULPHUR COMPANY

75 East 45th St., New York 17, N. Y.  
811 Rusk Ave., Houston 2, Texas

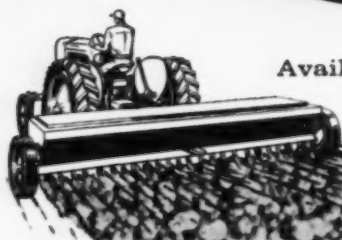
Sulphur Producing Units: Newgulf, Texas • Spindletop, Texas • Moss Bluff, Texas •  
Fannett, Texas • Worland, Wyoming • Okotoks, Alberta, Canada

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**GRANULAR**

**TRIPLE  
SUPERPHOSPHATE**

**46% Available Phosphoric Acid**



**Available in Bags or Bulk**

A dust free product of uniform size that  
will not bag set under normal storage conditions—  
flows freely to provide uniform distribution.

For requirements—Contact Our Sales Agents **BRADLEY & BAKER**





# Arcadian® News

Volume 5

For Manufacturers of Mixed Fertilizers

Number 8

## Are You Sure You Use the Right Solution?

### **IT PAYS TO BE CERTAIN YOUR NITROGEN SOLUTION FITS YOUR PARTICULAR NEEDS**

**Listed elsewhere** in this issue of ARCADIAN® News is the complete line of ARCADIAN Nitrogen Solutions with data about the chemical composition and physical properties of each solution. This line has been designed to cover the wide range of requirements for producing all grades of mixed fertilizers under all conditions of manufacturing.

Your selection of the ARCADIAN Nitrogen Solution that fits your particular needs can increase the efficiency of your operation, help you to produce better quality fertilizer, and save you money.

#### **Choice can be Simple**

Under certain conditions, this selection is easy to make. When only one or two fertilizer production factors are important—such as improving physical condition or cutting costs to meet competition—any one of several ARCADIAN Nitrogen Solutions may be suitable to obtain the desired results.

There are other cases where the choice is simple. For example, you may have been successfully producing pulverized fertilizer by using a certain solution, when it suddenly becomes necessary to obtain better control of moisture in the formula. Here again, you can accomplish

this by using any one of several ARCADIAN Solutions.

#### **Choice can be Complicated**

Your selection of the right solution becomes complicated when numerous factors assume importance in your production problem. For instance, you may wish to generate more heat in the process of granulation. Added to this may be the desire to use the water in the solution for greater uniformity of water distribution with improved safety of operations. As such factors increase, they reduce your choice of solutions.

You may reach the point where it is advisable to re-evaluate the importance of each factor before making your final selection of the right solution, particularly if costly changes in methods or equipment are contemplated. And it pays to make sure you examine the chemical composition and physical properties of each solution in the ARCADIAN line before making your choice.

#### **Freedom of Choice**

The big and diversified line of ARCADIAN Nitrogen Solutions offers you a wide range of opportunities in formulating and manufacturing fertilizers. Specific solutions are designed to meet specific requirements. For

*(continued on following page)*





**Nitrogen Division technical men systematically check and analyze the quality and uniformity of ARCADIAN Nitrogen Solutions.**

*(continued from preceding page)*

example, ARCADIAN URANA® Solution adds desirable urea—along with other forms of nitrogen—while improving the physical condition of the fertilizer.

Some ARCADIAN Solutions provide large amounts of nitrate as well as large amounts of total nitrogen in the formulae—all at low cost. Other ARCADIAN Solutions are used in large quantities for their contribution to granulation, achieved at the lowest possible cost of materials and operating expense.

There is a demand today for fertilizers with a high concentration of plant foods and this demand is being met by using the right ARCADIAN Solution. For instance, when ARCADIAN NITRANA Solution 3 is reacted with 75% phosphoric acid, the resulting product in the formula is 22.4% N and 40.0%  $P_2O_5$  or a total of 62.4% plant food (dry basis).

ARCADIAN Nitrogen Solutions add the amounts and forms of nitrogen you want in your fertilizers, plus including the physical properties that are right for your conditions, such as suitable salting out temperatures and reasonable vapor pressures for care-free operation of your ammoniating equipment the year round.

#### **Ask Nitrogen Division**

A Nitrogen Division technical service man will be pleased to help you select ARCADIAN Nitrogen Solutions that fit your particular needs—to increase the efficiency of your operation, help you produce better quality fertilizers, and save you money. Contact: Nitrogen Division, Allied Chemical Corporation, 40 Rector Street, New York 6, N. Y.

## **BASIC FACTS ABOUT NITROGEN SOLUTIONS**

Technical literature, tables and graphs often list the physical properties of ammoniating solutions. Although dependent upon the chemical make-up of ingredients, these physical properties are very important to the proper understanding and handling of ammoniating solutions. Check your knowledge of nitrogen solutions on these basic concepts:

### **1. DENSITY**

The density of a liquid is expressed as the weight per unit volume, for example: pounds per gallon. Tank capacities and liquid flows are commonly measured on a volume basis. Density values are necessary in converting the volume measurements to weights, as in formulation per ton.

Because the density varies with temperature, the temperature must be specified. The density of a given liquid can be determined anywhere along the line from solidification temperature to boiling point. However, density is usually quoted at some temperature close to normal operating temperatures.

### **2. SPECIFIC GRAVITY**

For convenience, ammoniating solutions are often quoted in terms of spe-

cific gravity rather than density. The specific gravity of a substance is the ratio of weight of any volume of it to the weight of an equal volume of some other substance taken as a standard. The standard for liquids is water. Therefore, the specific gravity of an ammoniating solution is the ratio of its weight to the weight of an equal volume of water. As in the case of density it is necessary to specify the temperature of the ammoniating solution and the water.

All liquids lighter than water have a specific gravity less than 1,000 and all liquids heavier than water have a specific gravity greater than 1,000. For simplification, 60°F is taken as the common temperature at which to quote both density and specific gravity. Water at 60°F weighs 8.334 pounds per gallon. Therefore the density of any liquid can be calculated from its specific gravity at 60°F by multiplying its specific gravity by 8.334. Conversely, the specific gravity of a liquid can be calculated by dividing its density at 60°F by 8.334.

### **3. VAPOR PRESSURE**

The vapor pressure of a solution is the pressure exerted by a vapor or gas released from the solution exclusive of

any influence of added air. It is measured at the surface of the liquid when a state of equilibrium has been reached between the solution and its vapor. Vapor pressure is a function of temperature, and is usually given in terms of gauge pressure, that is—the pressure exerted by the solution above atmospheric pressure. When the vapor pressure of a solution exceeds that of the confining atmosphere, the liquid boils.

Knowing the vapor pressure exerted by solutions, at normal operating temperatures, is of great importance in any consideration of the ease with which solutions can be handled. For example, if such an ammoniating solution were being handled by use of a pump at atmospheric pressures at a temperature where the solution exerted vapor pressure, enough ammonia would be released in the suction side of the pump to vapor-lock it. However, if enough air pressure to overcome this vapor pressure is applied to the tank that supplies the pump, the ammonia would be confined to the solution and it could be handled quite satisfactorily by pumping.

#### **4. SALTING OUT**

If ammoniation solutions become too cold, crystallization occurs. The highest temperature at which salt crystals can begin to form is the salting-out temperature or saturation temperature. At any temperature below this saturation temperature, there is possibility of crystals forming which may clog valves and fittings. There is also the possibility of adverse influence on quality and even the analysis of the product.

Under some conditions, solutions can be cooled below the saturation temperature without immediate formation of crystals. In this super-cooled condition, the solution is sensitive to common influences such as vibration, foreign matter or temperature changes which can bring about heavy precipitation of crystals without warning. Since it is impractical to control these influences, many operators protect themselves by avoiding temperature ranges where this trouble can develop. Salting out is one of the most serious problems in operation and safety and every precaution should be taken to safeguard against this possibility. In recognition of this problem the principal properties of ARCADIAN Solutions include the approximate temperature at which salt crystallization begins. This is the highest temperature at which crystallization occurs.

*When you desire information of any type about nitrogen solutions, contact: Nitrogen Division, Allied Chemical.*

## **Materials, Methods and Equipment used in making LIQUID FERTILIZERS**

**There is widespread** and growing interest in complete liquid fertilizers. Here is some technical information that will interest manufacturers who are now producing liquid fertilizers and others who are considering the idea of going into producing N-P-K in liquid form.

#### **Raw Materials**

Complete liquid fertilizers, which consist of various fertilizer compounds reacted together by dissolving them with water, are commonly manufactured by combining 4% parts by weight of 75% phosphoric acid with one part by weight of ammonia (either anhydrous or aqueous). This results in a near-neutral 1-3-0 base solution, to which additional nitrogen salts, potassium and water are added as required by formula.

Potassium is usually supplied as 62.5%  $K_2O$  equivalent, chemical grade muriate of potash. Potassium carbonate may be used, in which case allowance must be made for the alkaline value of the carbonate in neutralizing the phosphoric acid because less free ammonia is required to bring the solution to a definite pH.

Supplementary nitrogen is supplied from nitrogen solutions, urea, or ammonium nitrate. Urea, either as such or contained in one of several solutions, is commonly used because of its concentration and high degree of solubility.

#### **Manufacturing Methods**

The first step in the manufacturing of liquid fertilizers is usually the mixing of the phosphoric acid with water. The quantity of water used must be large enough to keep the phosphoric salts in solution when ammonia is introduced into the acid-water mixture.

The next step is the introduction of ammonia into the phosphoric acid-water mixture. If anhydrous ammonia is used, a double reaction takes place. First, the addition of ammonia to water results in a reaction forming ammonium hydroxide,  $NH_4OH$ . This reaction is accomplished by the production of heat (heat of solution).

Secondly, the ammonia reacts with the phosphoric acid, forming mono-ammonium phosphate,  $NH_4H_2PO_4$ , and di-am-

monium phosphate,  $(NH_4)_2HPO_4$ . This reaction also produces heat (heat of reaction). Grades having high phosphorus contents require large quantities of ammonia to neutralize the phosphoric acid, thus producing high heats of reaction. This heat can be partially controlled by adding to the acid an aqueous solution of ammonia, thus avoiding the heat caused by mixing anhydrous ammonia and water.

Various amounts of nitrogen or potash are added to make a desired grade. The addition of such compounds as urea, ammonium nitrate and potassium chloride creates an endothermic reaction; that is, the solution must absorb heat in order to dissolve the added compounds. A rule of thumb which might be used for a crude estimate of temperature decrease involved in making a liquid formulation by the addition of ammonium nitrate, urea or potassium chloride to a neutral solution is that the temperature of the solution will decrease 2.2 degrees F. for each per cent nutrient contributed from potassium chloride or urea and 2.7 degrees F. for each per cent nutrient contributed by adding ammonium nitrate.

To control the salting-out temperature and corrosive effects of the finished products, it has been found advisable to neutralize the phosphoric acid to a point part way between the formation of mono-ammonium phosphate and di-ammonium phosphate. This is so that the total ammonium phosphate present is roughly about  $\frac{1}{2}$  mono- and  $\frac{1}{2}$  di-ammonium phosphate. This gives a pH value of around 6.2 to 7.0 depending on how far the neutralization is carried and the particular combination of salts present.

#### **Manufacturing Equipment**

Manufacturing processes generally fall into one of three categories:

1. The batch weighing system in which raw materials are progressively charged into the reactor, which is usually mounted directly on a scale beam.
2. The metering system in which liquid raw materials are metered into the reactor and solids weighed.
3. The weigh-holding tank system, in

*(continued on following page)*

(continued from preceding page)

which liquid materials are pre-measured in holding vessels and dry materials weighed. Many combinations of these three systems are presently in use. Continuous processes are possible with a metering system.

#### New Developments

Refined wet-process phosphoric acid is gaining wide use in the manufacture of liquid fertilizers, as a result of the devel-

opment of new methods of holding in solution the precipitates formed by the use of this acid. This represents a significant savings, because of the lower cost of wet-process acid as compared to furnace grade acid.

Experimental work in the field with a concentrated super-phosphoric acid has resulted in higher analyses than were formerly possible with favorable salting-out temperatures.

The recent use of clay suspending

agents to overcome salting-out problems attendant with higher analyses also shows some promise in the field.

#### Ask Nitrogen Division

If you desire additional information on the production of complete liquid fertilizers, get the advice of a Nitrogen Division technical service man. Contact: Nitrogen Division, Allied Chemical Corporation, 40 Rector Street, New York 6, N.Y. Phone: HANover 2-7300.



## NITROGEN SOLUTIONS

	CHEMICAL COMPOSITION %					PHYSICAL PROPERTIES			
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60°F	Approx. Vap. Press. at 104°F per Sq. in. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
<b>NITRANA®</b>									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	15
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.184	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.050	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
<b>URANA®</b>									
6C	43.0	20.0	68.0	6.0	6.0	9.3	1.180	12	39
6M	44.0	22.0	66.0	6.0	6.0	10.0	1.158	17	14
10	44.4	24.5	56.0	10.0	9.5	11.0	1.114	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.087	25	-7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
15	44.0	28.0	40.0	15.0	17.0	12.7	1.052	29	1
<b>U-A-S®</b>									
A	45.4	36.8	—	32.5	30.7	16.2	0.932	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.978	48	46
Anhydrous Ammonia	82.2	99.9	—	—	—	24.3	0.618	211	-108

Other ARCADIAN® Products: URAN® and FERAN® Solutions • Ammonia Liquor • N-dure® A-N-L® • Ammonium Nitrate • UREA 45 • Nitrate of Soda • Sulphate of Ammonia

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# The Editor Looks Back

Yes, the editor looks back—and forward, too.

It has been fascinating, putting together this 50th Anniversary section. A magazine, especially a trade magazine, has a character all its own. And no matter how editors may come and go, the character shines through everything they do.

Trade magazines reflect the hopes and fears of the industry they represent, and changes in the business situation make changes in the trade paper. But basically the pattern is the same through the years.

You can see this in the examples selected for the following 36 pages. The study of fertilizer consumption we made in 1912 is the forerunner of our present tonnage tabulation. But what a difference! "Manure used to fill chuck-holes." "Not a single ton used in our state." Compare that with this month's tabulation, and realize what strides our industry has really made.

We have kept the record, and helped to fight the industry battles all along—home-mixing; the great potash struggle with Germany; the foreshadowing of the great place granulation now holds; the progress of fertilizers applied in liquid form; the tremendous development in the less fortunate areas, where education is making new markets for plant foods. Above all we have recorded the development of the fertilizer industry in our own country from its early growth to the prominent place it holds today.

And may we say that all of us owe a deep debt of gratitude to the Land Grant Colleges; to the great band of County Agents; to the Associations, national and sectional, which have contributed so much to the education that fostered this growth. Through the years we have reported, and supported, their constructive work, just as we have covered the fine research done by major suppliers—for the good of the industry.

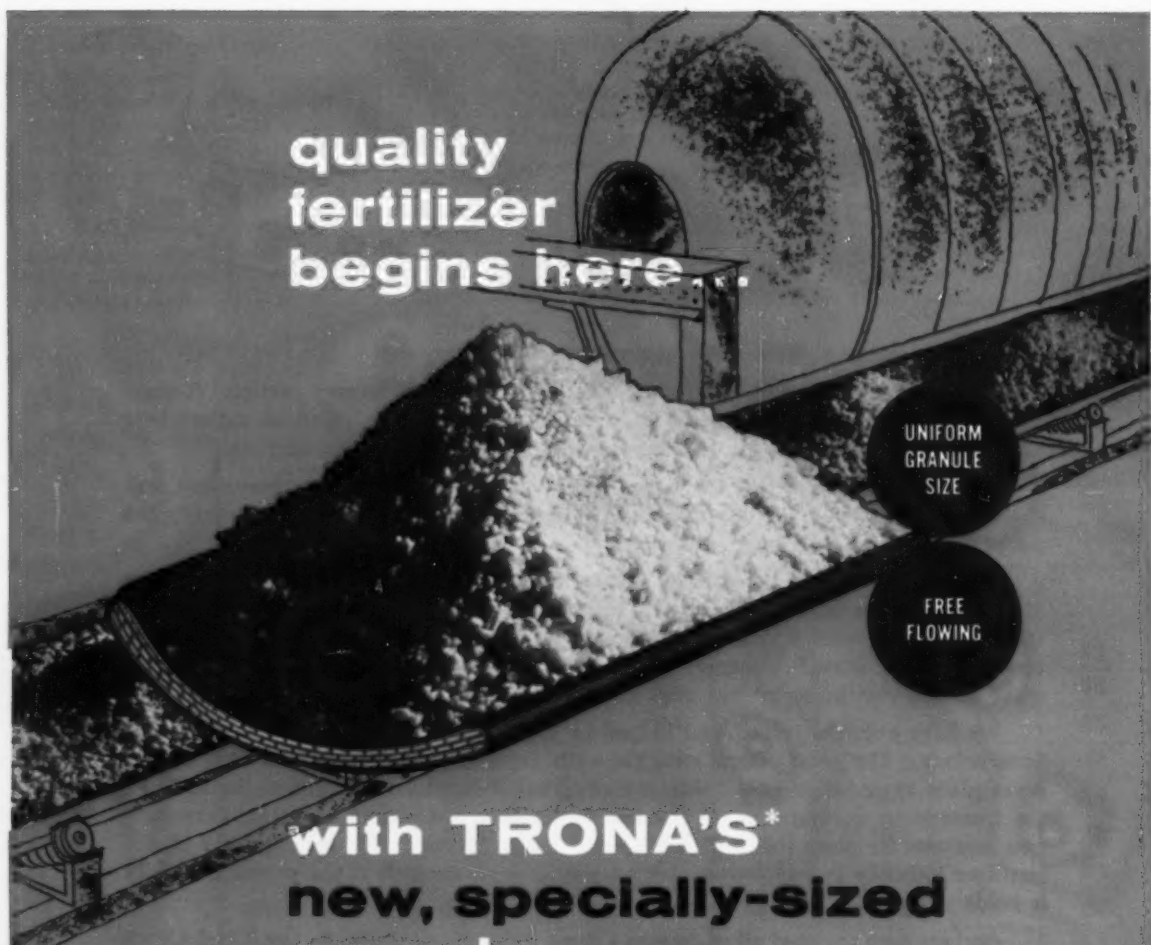


The late WALTER W. BROWN, who founded COMMERCIAL FERTILIZER in 1910

Through it all, Commercial Fertilizer has remained as it began, a magazine to serve the fertilizer industry, and that industry alone.

The fertilizer industry is highly competitive, of course. This is as it should be. But it is also an industry which pulls together, works together — and thinks ahead together in the development of bigger markets in a more prosperous agriculture.

Commercial Fertilizer has been at it half a century now, and we look at those fifty years of effort not as a monument, but as a springboard to even better service to our industry in the next half-century. If there opens up a need for plant food on Mars or Venus or the moon, you may be sure Commercial Fertilizer will broaden from its present international position to cover the industry news of the planets and the galaxies.



quality  
fertilizer  
begins here...

UNIFORM  
GRANULE  
SIZE

FREE  
FLOWING

with TRONA'S<sup>\*</sup>  
new, specially-sized  
granular

# POTASH

Quality fertilizer granulation begins with Trona's all-new, specially-sized granular muriate of potash. The carefully regulated and controlled screen size results in reduced segregation and uniformity of finished product. Whatever your mixing method—batch or ammoniation, Trona's new granular assures a quality fertilizer uniform in particle size.

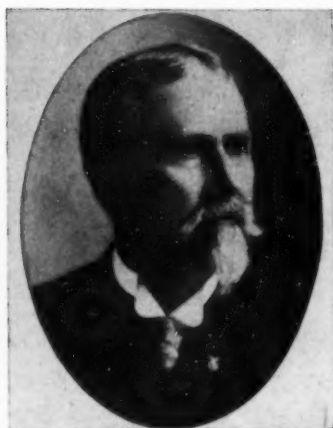


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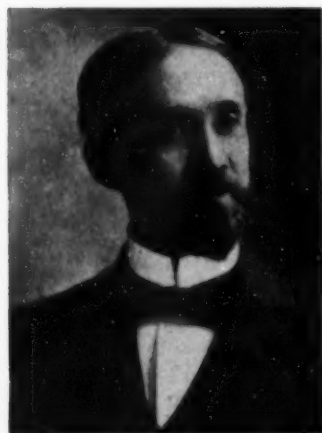




W. G. SADLER  
National Fertilizer Association Secretary  
in 1911



MARVIN V. CALVIN  
Director of the Georgia Experiment  
Station in 1910



DR. B. W. KILGORE  
Director of North Carolina Department  
of Agriculture's Test Farms, and  
Secretary-treasurer of Southern  
Agricultural Workers Association in 1912

## Men of Yesteryear

When our staff first thought about Commercial Fertilizer's 50th Anniversary Edition, there was much talk about what to do, how best to produce it.

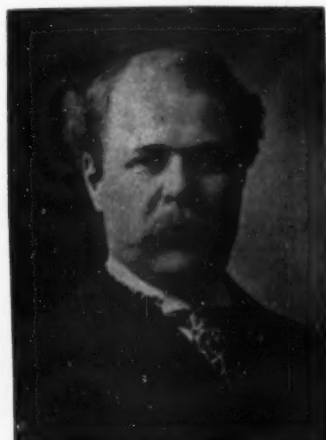
And at that time, without a scrap of evidence to go on and with no facts based on digging back in CF's musty old bound volumes, at least one member of the staff had visions of a long-ago fertilizer industry filled with mustachioed gents with high collars and heavy gold watch chains, judiciously draped. Plus a liberal sprinkling of cloak and dagger price-cutters, cruelly upsetting the sedate pace of the fertilizer business.

So you can imagine our surprise not to find the cloak and dagger men—not pictured anyway—in those long-ago issues. But we did find the mustachioed gents in plentiful supply. As you can see.

And we were amused with the variety of tonsorial didoes we did dig up,—in the person of some very dignified and well known industry men, whom you may recall and who appear on this page.

But times and styles change—today the brush has gone (but for beatniks), collars are low and comfortable, and heads close-cropped or crewcut.

But bewhiskered or mustached or clean shaven—we salute our men of yesteryear!



H. L. RUSSELL  
Dean and Director of the College of  
Agriculture of the University of  
Wisconsin in 1910.



DR. A. M. SOULE  
President of Georgia State College of  
Agriculture in 1910 and a regular  
contributor to early issues of this magazine



E. L. PARSONS  
Partner in Banks, Parsons & Co., brokers  
of phosphate rock and acid phosphates,  
established 1908.



F. B. MUMFORD  
Dean and Director of the University of  
Missouri College of Agriculture and  
Agricultural Experiment Station in 1910.

This may read like a current message from an association president, until you begin to get into the prices. Then you will realize that this came from Commercial Fertilizer's 1935 Year Book. But it is still basically a good message—

## A Message to the Industry

by JOHN J. WATSON

*President of the National Fertilizer Association*

This season in our Industry has been one of uncertainty. We have a vast over-capacity in the fertilizer manufacturing plants of the country, yet, many small mixers have started operations in an attempt to chisel under prices, and in an attempt to upset our Code of Fair Practices which has really been of great benefit to the farmers at large.

Our profits have been small, and oftentimes we have had losses. The gain to the farmer by using fertilizer on crops brings him a profit in the increased yield of from \$75 to \$100 on every ton of fertilizer used, based on

present prices for farm products.

Depending on the grade delivered, this ton costs him approximately \$25, and the records show that the fertilizer company that makes \$1.50 per ton on the fertilizer it sells is operating way above the average company, considering the percentage of profit.

In other words, the fertilizer manufacturer is fortunate if he makes \$1.50 on a ton of fertilizer, while the farmer by his use of fertilizer increases his profit from \$75 to \$100 by each ton used.

If this information should be dis-

seminated to agriculture at large, it would offset much of the vicious and unfair propaganda that has been made against our industry by a few demagogic politicians whose only interest is to play for the farmer's vote, and would nullify such attacks and show the farmer who his real friends are and that the Fertilizer Industry is giving him more than a fair deal.

Our Industry should not be confused or stampeded into unwise action by such attacks, but should confine itself to showing to the farmers of the country our ability to help them raise a larger crop with a larger profit.

## INTERNATIONAL COMMODITIES CORPORATION

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### FERTILIZER RAW MATERIALS

PHOSPHATE ROCK  
SUPERPHOSPHATE 20%  $P_2O_5$   
TRIPLE SUPERPHOSPHATE 46% 48%  $P_2O_5$   
SULPHATE OF AMMONIA  
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COMPLETE FERTILIZER MIXTURES MADE TO ORDER

# Plant Pictures from the Past

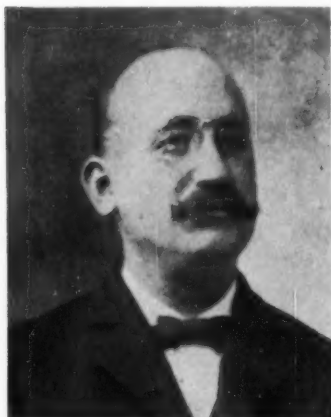
This old-time woodcut reproduction was the first plant picture to appear in *Commercial Fertilizer* magazine, and may have been old when it appeared in 1910. Maybe we could date it pretty closely by counting the stars in the flag . . .



GEORGIA CHEMICAL WORKS, AUGUSTA, GA.

Pictured below is the plant of Beta Fertilizer Company at Eatontown, N. J. and F. G. Hoffman, vice president and secretary of the firm. The occasion for the pictures was a letter from Mr. Hoffman, published in our November 1910 issue, praising the magazine's campaign against home-mix-

ing of fertilizers by farmers. Mr. Hoffman's letter said, in part, "It stands to reason that a concern is not going to spend thousands of dollars to go into the fertilizer mixing business" if the farmer could mix his materials as well by hand.



This picture of Catawba Fertilizer Company's plant at Lancaster, S. C., taken from our July 1911 issue de-

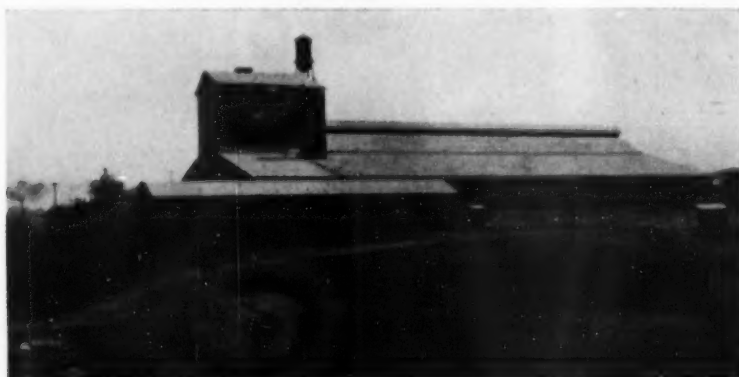
scribes that 'prosperous establishment' thus:

*The daily capacity is 100 tons of*

*mixed phosphate, and 400 tons of complete mixed fertilizers put up in bags. They sell bulk acid phosphate, and all grades of mixed fertilizers, as well as nitrate of soda and all forms of potash salts, which they manufacture.*

*The factory is equipped with the latest improved fertilizer machinery known to the fertilizer trade, and therefore, every facility for handling business without delay is enjoyed.*

*The company is in charge of experienced fertilizer men, the manager, Mr. R. L. Collins, having formerly been connected with the Read Phosphate Company, while the superintendent was formerly with the Virginia-Carolina Chemical Co.*



Our May 1911 issue carried these pictures—exceptionally good for their day—and this story.

## Mayer Fertilizer Company

### St. Louis, Mo.



FACTORY

LARGE ENGINE ROOM SCENE



MAIN OFFICE (Note 'Anchor' trade mark on pipe)



AUTOMATIC SACKING MACHINE



The Mayer Fertilizer Co. is one of the oldest and best known concerns of the kind in the country, and its famous Anchor Brand is in well nigh universal use in Missouri and adjacent States. It has stood the test of years. Mayer's "Anchor Brand Pure Bone Fertilizers" have now been before the public forty-five years, and their record as crop producers, as well as soil builders, have never been surpassed by any other brand. Their reputation is now established throughout the Ohio and Mississippi Valley States.

We give herewith some views of the Mayer plant at St. Louis, which is one of the best equipped plants in the Middle West. The buildings are conveniently designed for the business and strongly constructed of brick and concrete, one, two and three stories in height. Every mechanical precaution is taken against fire, and automatic sprinklers are distributed where they will do the most good in such an emergency. The power employed is steam, two Corliss engines, of 300 and 100-horsepower, respectively, being used. The company operates its own

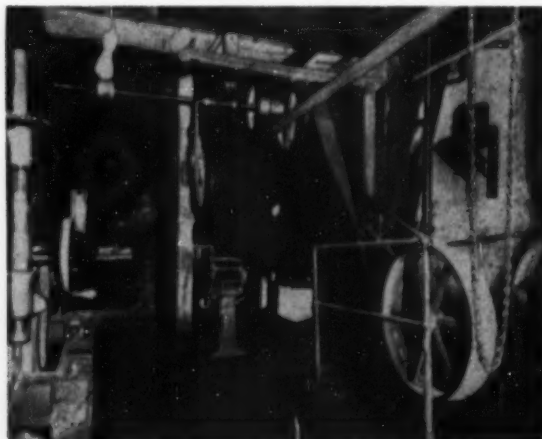
electric light plant and machine shop. The entire machine equipment is strictly up-to-date, including some of the latest and most expensive machines. The plant has a daily capacity of from 100 to 150 tons. Its output consists of acid phosphates, commercial fertilizers, bone meals, dry tankage, etc. The sale of chemicals in connection with fertilizer sales is also large.

The famous "Anchor" fertilizers have been manufactured by the Mayer Fertilizer Co. since 1863. They received a gold medal at the great World's Fair in St. Louis—the only award of the kind to a fertilizer product.

St. Louis being an unusually good point from which to ship in any direction, and enjoying minimum freight rates, the Mayer plant is at an advantage in this important regard.

The season lately closed was the best in the history of this enterprising concern, and the outlook from the standpoint of the firm was never so bright. They have well earned the success they have achieved.

MACHINE SHOPS—LIGHTING POWER PLANT



ONE OF THE LOADING AND UNLOADING PLATFORMS

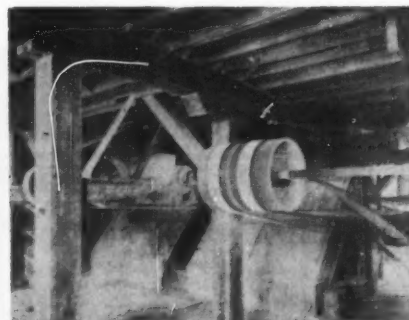


COMMERCIAL FERTILIZER





Greatly Reduced Photograph Showing a General View of the Main Building of the Congaree Fertilizer Plant.



Perfecto Separators, Where the Pulverized Rock is Screened and Made Ready for the Sulphuric Acid Application.

## Congaree Fertilizer Co., Columbia, S. C.

Our March 1911 issue carried these pictures, and the story 'Big Congaree Plant in Operation' as follows:

Columbia, S. C.—The Congaree Fertilizer Company, whose plant has just been completed and machinery installed, is not only a very valuable addition to Columbia's present manufacturing industries, but this fertilizer plant easily ranks as one of the most complete and modern guano factories in this section of the South. It is located near both the Southern and Atlantic Coast Line railroads, with spur tracks from both lines of road running along the entire length of the building, with modern loading platforms so constructed that all goods may be loaded and unloaded from and into the main building.

This fertilizer plant is now running both day and night and expects to put out fully twenty thousand tons of fertilizer this season. It has an annual capacity of thirty-five thousand tons. Every piece of machinery is of the very latest pattern and nothing has been omitted to make this one of the very best fertilizer factories in the country.

The Congaree Fertilizer Company is operated by men of long experience in the fertilizer business. C. J. Shannon, Jr. of Camden, is president, and Paul R. Bratton, secretary and manager.

When running on full time during the fertilizer season, the pay roll of this factory will run around \$1,000 per week.

The product of this fertilizer factory will consist of acid phosphate and commercial fertilizers, the plant having a daily capacity of 500 tons of fertilizer and 100 tons of acid phosphate.

The Congaree Fertilizer factory is installed with some new machinery features that are a great improvement over

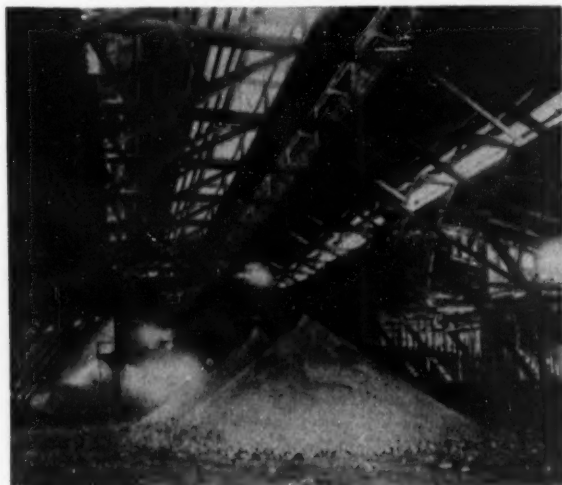
the old methods of fertilizer manufacture commonly employed. This is especially true with the machinery installed in the mixing department. There are also here employed several labor saving devices in machinery. The bin system this plant uses for allowing chemical action to take place very materially lessens the labor and at the same time gives a much superior mixture as compared with the old methods.

This fertilizer factory is two hundred and forty feet long and one hundred and seventy feet wide. The total cost of the plant is \$60,000. Notwithstanding this large ground space, the main building is four stories and well built, making it one of the very best fertilizer factories in the country.

The entire plant is run by electricity, allowing the use of machinery that is specially adapted for the products turned out. The Maxecon phosphate rock grinding machine is the very best and most highly improved machine that can be obtained and it is in many ways a great improvement over the grinding mills generally in use. In fact, all the machinery used in the Congaree factory is of the very highest and most approved quality manufacturers of the country. This factory is also equipped with two platforms, one used exclusively for loading cars and the other for unloading the raw material from the cars.

The Congaree factory as a result of new machinery and strictly modern equipment has produced several entirely new fertilizer formulas that have been found to be highly satisfactory and specially adapted to the climate, soil and crops of this State.

Main Storage Room, Where Raw Materials are Stored Ready for Mixing

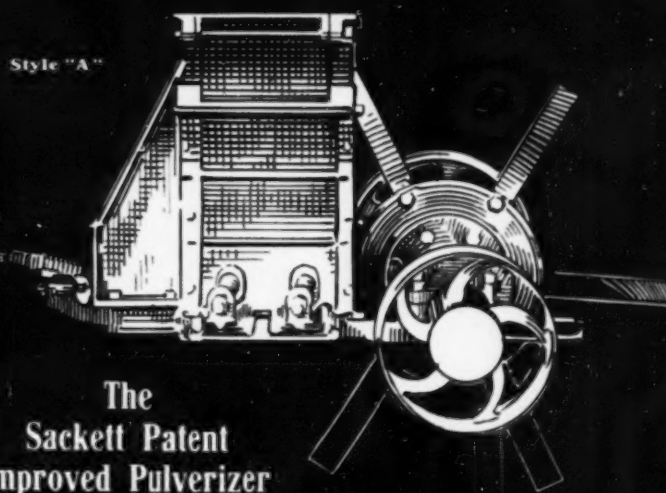


Loading Platform, Where All Products are Loaded for Shipment.



# Fertilizer Machinery

Of SACKETT PATENTS are of the most improved type. They are built for hard service and will cut quite an item from your repair bills : : : : :



The  
Sackett Patent  
Improved Pulverizer

This Machine, being provided with Automatic Adjusting Shears and Vibrating Front, is especially adapted to the milling of Acid Phosphate and for manipulating fertilizers generally. In action, the Pulverizer consists of a series of blades or beaters, each having two cutting edges passing between Automatic Shears at the bottom of the Hopper. The action being direct overcomes friction and gives effective results whether the tailings are soft or hard.

The front and sloping sides of the Hopper are adjusted to work automatically, in case any foreign substance, as iron should get into the Hopper, the Automatic Adjustments will vibrate and allow the material to pass through without injuring or stopping the machine, thus dispensing with the usual loss of time in readjusting.

Send for Catalogue of Fertilizer Machinery.

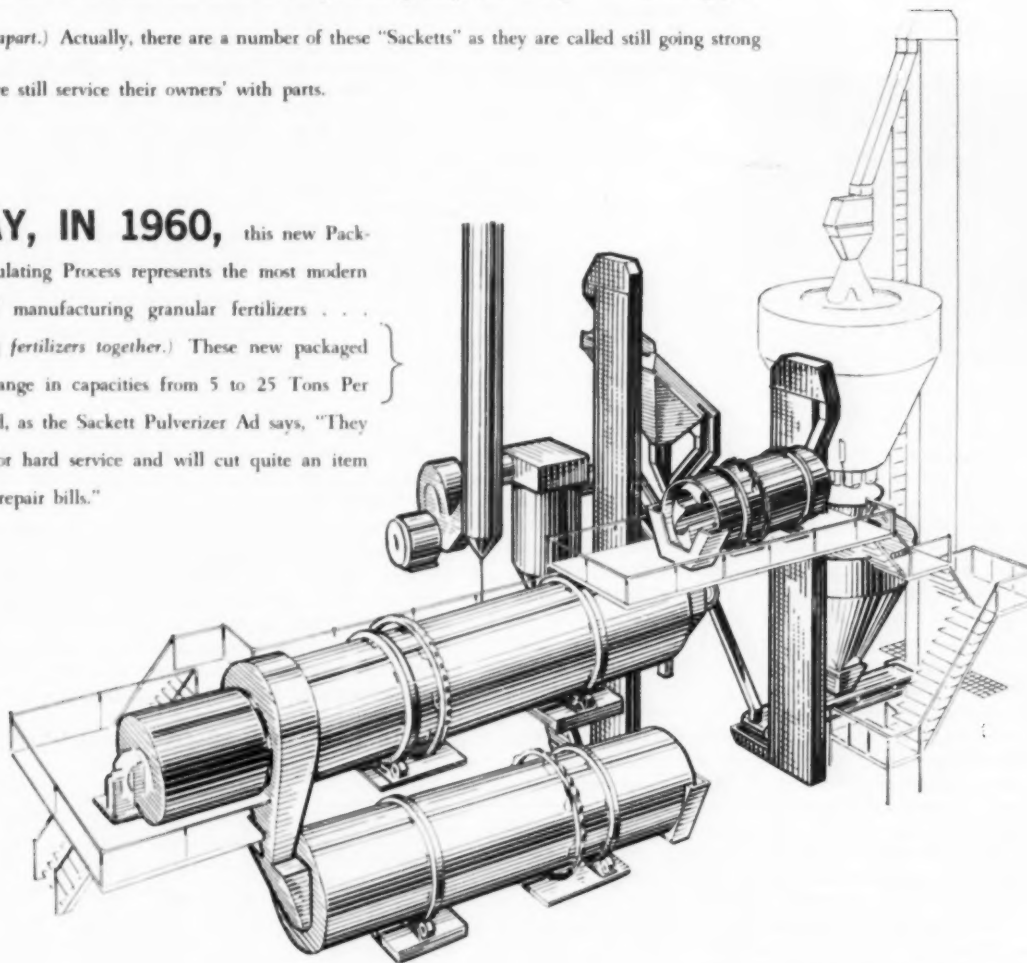
## A. J. SACKETT, Baltimore, Md.

When writing advertisers, please mention this Magazine.

## THE AD ON THE OPPOSITE PAGE ran in

Commercial Fertilizer's December, 1911 issue. At that time this Sackett Patent Pulverizer represented one of the most modern means of pulverizing lumps and tailings . . . (of taking fertilizers apart.) Actually, there are a number of these "Sacketts" as they are called still going strong and we still service their owners' with parts.

**TODAY, IN 1960,** this new Packaged Granulating Process represents the most modern method of manufacturing granular fertilizers . . . (of putting fertilizers together.) These new packaged processes range in capacities from 5 to 25 Tons Per Hour. And, as the Sackett Pulverizer Ad says, "They are built for hard service and will cut quite an item from your repair bills."



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# The Granulation of Fertilizer Mixtures

by William H. Ross and John O. Hardesty

Fertilizer Research Division  
Bureau of Chemistry and Soils  
U. S. Department of Agriculture



farmer may be nature and lack the conditioning effects of the organic ammoniates which they are replacing. A great deal of attention has accordingly been given of late to the effect of granulation on the properties of fertilizers and many processes have been proposed for the preparation of fertilizers in granular form. Some of these processes are adapted only to the granulation of fertilizer materials while others may be applied to the granulation of both materials and mixtures. Different processes may be conveniently grouped into five groups of shredding, compressing, and rotary drying.

Rotary drum and dryer used in the Fertilizer Division, Bureau of Chemistry and Soils, in the granulation of fertilizer mixtures. This photograph was one of the illustrations for the 1937 article.

## Summary

The processes that are now in use or have been proposed for the granulation of fertilizers are classified into the five groups of shredding, compressing, graining, spraying and rotary drying. The principles involved in these different methods of granulating are outlined briefly and the limitations of the methods are discussed.

The spraying method gives the most uniform product but this method is limited in its application to the granulation of fusible or readily-soluble materials. For the commercial granulation of fertilizer mixtures, the method of rotary drying seems to offer most promise. This method consists in adjusting the moisture content of the mixture by the addition of water or steam, if necessary, to the optimum for the mixture to be granulated, raising the temperature of the mixture to 60-80° C. by ammoniation or otherwise, rolling the mixture in a drum until granulation begins and drying in a rotary drier. Mixtures that consist largely of inorganic materials granulate more readily and with a lower moisture content than those that are relatively high in organic matter.

There is little or no cohesion between the particles of a coarsely crystalline material and a material of this kind can not be granulated by the method of rotary drying unless its plasticity is increased by grinding a portion to a finely-divided condition. Most fertilizer mix-

tures that are not composed of granulated materials contain a sufficient proportion of finely-divided material to permit of granulation by this method with little or no previous grinding.

Granulation of fertilizer mixtures (1) reduces caking; (2) prevents segregation; (3) improves the drillability of the mixture; (4) decreases handling charges; (5) eliminates the necessity of using high-priced conditioners; and (6) by bringing about a rapid cooling of the mixture, prevents the loss of plant food that results when ammoniated mixtures containing dolomite are stored in large piles at an elevated temperature.

TABLE 2.—FORMULAS OF GRANULATED FERTILIZER MIXTURES

Material	(4-16-4) <sup>1</sup>	(5-20-5) <sup>1</sup>	(5-10-5) <sup>1</sup>	(5-10-5) <sup>1</sup>	(4-8-7) <sup>2</sup>
Superphosphate	1225	640	816	816	794
Double superphos.	157	588	86	86	--
Free ammonia	37	60	30	30	--
Ammonium sulfate	146	192	288	192	195
Sodium nitrate	123	61	92	61	123
Tankage	--	--	--	--	227
Cotton seed meal	--	--	--	347	--
Muriate of potash	138	173	173	173	270
Kieserite	50	--	--	--	95
Dolomite	124	286	340	286	230
Filler (sand)	--	--	175	9	66
	2000	2000	2000	2000	2000

<sup>1</sup> Granulated for the N. Y. (Geneva) Agr. Experiment Station.

<sup>2</sup> Granulated for the Maine Agr. Experiment Station.

TABLE 1.—GRANULATION OF FERTILIZER MIXTURES

No. of Mixture	Formula	Soluble Salts Per cent	Temperature of Granulation °C.	Initial Moisture Content Per cent	Screen analysis in per cent of mixture—				
					-5	5-10	10-20	20-30	-30
1	8-16-8	82	75	10	2	55	42	1	0
2	6-12-6	61.5	75	10	1	82	16	1	0
3	4-8-4	41	75	10	2	88	7	1	2
4	6-12-6	61.5	75	25	6	58	33	2	1
5	12-16-12	72	55	15	1	70	27	1	1
6	"	68	60	6	0	50	37	7	6
7	"	64	50	8	0	63	33	3	1
8	8-16-16	75	45	9	0	53	43	3	1
9	"	62	70	16	21	49	11	11	8
10	8-12-20	81	60	12	0	63	32	4	1
11	"	64	60	13	2	70	13	7	8
12	8-24-8	57	60	16	0	51	38	3	8

A. Nitrogen as Nitrogen Solution II, ammonium sulfate, potassium nitrate and ammonium phosphate.

B. Nitrogen as Nitrogen Solution II, ammonium sulfate and potassium nitrate.

C. Nitrogen as urea, Urea-Ammonia Liquor and ammonium sulfate.

D. Nitrogen as urea and Urea-Ammonia Liquor.

## 10 YEARS

before the conventional method of granulation was a reality, Commercial Fertilizer magazine carried this fine research report by William Ross and John Hardesty. At the left is a scaled-down reproduction of a portion of the opening page of the article just as it appeared in our 1937 Year Book. The authors' own summary pretty well describes the full article, but we thought our readers might enjoy seeing the formulas and mechanical data contained in two of the tables which accompanied the material.



# USDA's 50 years

## of Fertilizer Technology Research

by  
MILDRED S. SHERMAN\*

In March 1911 Congress first allocated \$12,500 to the Department of Agriculture for fertilizer investigations. At that time the Government had no center for systematic research in fertilizer technology. Scarcity of nitrogen materials and concern over the German potash monopoly prompted Congress, at the request of President Taft, to direct the Bureau of Soils to survey possible sources within the United States of supplies of potash, nitrates, and other natural fertilizers.

The Bureau of Soils had been set up in 1901 under Milton Whitney, with the transfer of soils studies from the Weather Bureau. Here Frank Cameron, Oswald Schreiner, Milton Whitney, and their associates had investigated, among other subjects, soil moisture, soil reactions, and soil fertility, and had undertaken phase-rule studies of phosphate systems. The first work under the new appropriation was the preparation of a monumental report on the "Fertilizer Resources of the United States" which was issued as Senate Document 190 on December 18, 1911.

Spurred by the outbreak of World War I, major attention was soon given to research on the fixation of atmospheric nitrogen. An experimental unit for direct synthesis of ammonia from atmospheric nitrogen, one of the first in the country, was constructed at the Department's Experimental Farm in

Arlington, Virginia, under the leadership of R. O. E. Davis, while W. H. Ross and associates investigated the oxidation of ammonia to nitric acid.

In March 1919 the War Department established the Fixed Nitrogen Research Laboratory, with inclusion of the Arlington fixed-nitrogen unit, on the campus of the American University, Washington, D. C., to study nitrogen fixation problems, especially in relation to the war-time plants built at Muscle Shoals, Ala. The Laboratory was transferred to the Department of Agriculture in 1921 and was merged with the fertilizer division of the Bureau of Soils in 1926. Including among its directors such eminent scientists as A. B. Lamb, R. C. Tolman, and F. G. Cottrell, the FNRL investigated the chemistry of ammonia synthesis and developed suitable catalysts, techniques, and equipment for this high-pressure reaction. These studies were a very important factor in the successful establishment of the Nation's synthetic ammonia industry which today is the world's largest. Prominent among the Laboratory personnel who participated in the earlier commercial developments of the industry were J. A. Almquist, D. C. Bardwell, J. M. Braham, E. D. Crittenden, R. L. Dodge, F. A. Ernst, R. M. Evans, C. S. Fazel, M. F. Fogler, A. T. Larson, C. N. Richardson, C. F. Weston, and C. H. Young.

Other researchers on nitrogen fertilizer contributed to the establishment of urea manufacture in this country. They also resulted in the development of urea-formaldehyde compounds capable of slowly releasing nitrogen for plant nutrition, the

first synthetic material having this property to be produced commercially. The Department's work on solid ammonium nitrate was a significant factor in the development and acceptance of this highly important material for general use as fertilizer.

Early laboratory and pilot-plant studies at the Arlington Experimental Farm, under the leadership of W. H. Ross and W. H. Waggaman, led to direct manufacture of phosphoric acid by furnace methods. Here the Cottrell precipitator was first used to recover phosphoric acid directly from the oxidation products of the furnace gases. Besides W. H. Waggaman, Department personnel who participated in the commercial application of these processes included Forrest Barker, J. N. Carothers, C. B. Durgin, H. W. Eastwood, and T. B. Turley.

In later years the Department has made substantial contributions to the knowledge of superphosphate ammoniation, composition and properties of phosphate rock, and other phases of phosphate technology. Studies of the chemical reactions of phosphate rock at high temperatures resulted in the development and commercial application of a process for the production of defluorinated phosphate suitable for use either as fertilizer or as a phosphorus supplement for livestock.

From the beginning of the Department's fertilizer investigations, major attention was given to search for and development of sources of potash. Work in cooperation with the U. S. Geological Survey resulted in utilization of certain lake brines which furnished most of the Nation's meager supply of potash during World War I. Under the direction of J. W. Turrentine, who later became the first president of the American Potash Institute, a process was developed and an experimental plant was operated for

\* Mrs. Sherman, who graciously did this special article for COMMERCIAL FERTILIZER's anniversary issue, is publications editor for the Soil and Water Conservation Research Division, Agricultural Research Service, U. S. Department of Agriculture, Beltsville, Maryland.

extracting potash from the kelps of the Pacific Coast. Studies were subsequently made of the recovery of potash from potassium silicates and other insoluble minerals. It was not until 1931, however, that our independence in the matter of potash supplies was foreshadowed by the opening of the Carlsbad, N. Mex., deposits of soluble minerals.

Much of the Department's research has been concerned with the improvement of the grade and physical condition of mixed fertilizer, studies of which were initiated under the leadership of W. H. Ross

some 35 years ago. This work has furnished a large part of the data underlying the domestic production of granular mixtures—now more than 4 million tons annually—which have superior characteristics as regards handling, storage, and application in the field. Such mixtures favor the manufacture of higher grade products by permitting the use of concentrated materials with considerable savings in labor and transportation costs per unit of plant nutrients. Their production has been an important factor in raising the average nutrient content of

mixed fertilizers from 21.9 percent in 1948 to 30.7 percent in 1959, as compared with 14.8 percent in 1910.

Recent investigations have included studies of trace-nutrient materials, behavior of pesticides and other agricultural chemicals in mixtures with fertilizer, technology and utilization of liming materials, relation of the chemical and physical characteristics of fertilizers to their nutritive quality and efficiency, and development of fertilizers better adapted to meet the nutrient requirements of crops under specific conditions. The Department pioneered in the preparation of radioactive fertilizers, which are contributing new knowledge on soil-plant-nutrient relationships and interactions.

The fertilizer unit of the Department of Agriculture has been a source of trained personnel for the fertilizer industry. It furnishes advice to fertilizer manufacturers and supplies practical information to farmers on the use of fertilizers. It surveys the composition of marketed fertilizers and their annual consumption in the United States. It checks and develops methods for the analysis of fertilizers. And throughout its 50-year history it has maintained close contact with other agencies and has conducted studies with the State agriculture experiment stations.

The Department's research has helped to free us from foreign monopolies of fertilizer materials. It has lowered the cost of plant nutrients and has improved the quality of the nutrient carriers. It has developed fertilizers better suited for particular crops and conditions. It has shown how fertilizers should be applied in the field and how they may be used to improve the yield and the nutritional quality of crops, and combat soil erosion.

Fifty years ago farmers were often more impressed by the dark color and powerful odor of fertilizers than by their plant-nutrient content. But now the fertilizer industry is no longer dependent on natural organic materials from sundry waste and by-product sources. It is essentially a chemical industry whose products are manufactured under carefully controlled conditions and skilled technical supervision. This change accomplished during the past half century enables industry to meet the needs of today's agriculture. The American people can be justly proud of the Department of Agriculture's part in achieving this goal.

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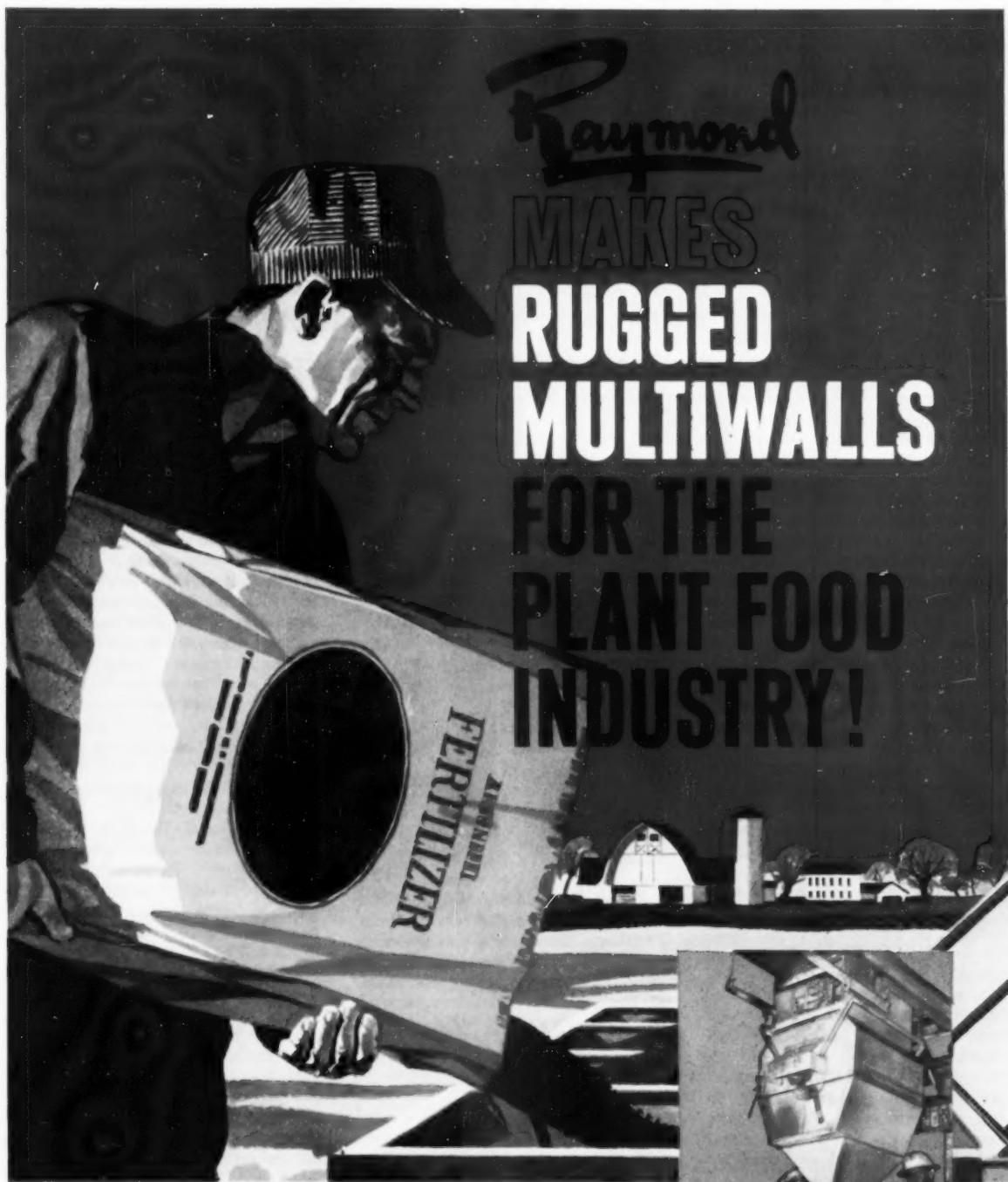
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# NATIONAL PLANT FOOD INSTITUTE

## ---- AND ITS "ANCESTORS"

### FERTILIZER INDUSTRY ASSOCIATIONS COMBINE FORCES THROUGH THE YEARS

The National Plant Food Institute, the present national trade association of the fertilizer industry, stands in the shadow of an illustrious record in terms of service to its members and to agriculture, achieved by its predecessor organizations.

The first general trade association representing the industry was an outgrowth of the informal fertilizer Exchanges, which earlier existed at seaboard ports, for the purpose of "exchanging" helpful information to stimulate trade and help solve common problems.

The organization was formed in Baltimore and was known as The National Fertilizer Association of Chemical Fertilizer Manufacturers. It was created to provide for the exchange of opinion between manufacturers and sellers of chemical commercial fertilizers and to consider national, state and municipal legislation as applied to tariff and trade regulations, insurance and freight.

Until 1883, the Baltimore organization functioned periodically in areas of interest to its members, when the National Fertilizer Association was organized and operated for a period of five years.

Six years lapsed before a more permanent organization was formed, under the name of The Association of Fertilizer Manufacturers in the West. This organization functioned until 1901, when the name was changed to Fertilizer Manufacturers Association and, later, in 1907, the name was again changed to that of an earlier organization, the National Fertilizer Association.

Southern manufacturers formed a separate organization in 1906 under the name of Southern Fertilizer As-

by  
LOUIS H. WILSON  
and  
WILLIAM S. RITNOUR



WILSON



RITNOUR

sociation. In 1925, the National Fertilizer Association and the Southern Fertilizer Association were combined to form the first truly national trade association, under the name of The National Fertilizer Association (incorporated in 1927).

In the early years of the industry,

EDITOR'S NOTE: When COMMERCIAL FERTILIZER asked the National Plant Food Institute for an article on the history and contributions the fertilizer industry had gained from its national trade association it was logical that the two men with the longest record of service in this activity—Louis H. Wilson, secretary and director of Information of the National Plant Food Institute, with fourteen years of service; and William S. Ritnour, treasurer of the National Plant Food Institute, with twenty-nine years of service, be selected to write the story. Both are well qualified by knowledge and experience for the job.

midwestern fertilizer manufacturers recognized a need for localized educational promotions, separate from the major trade association—the National Fertilizer Association. Thus, in 1911, the Middlewest Soil Improvement Committee was formed and, together with the Southern Fertilizer Association, concurrent programs were established to promote regional educational projects relating to fertilizer. In 1925 educational activities of the existing southern and midwest groups were incorporated in The National Fertilizer Association's program.

The National Fertilizer Association continued as an organization representing a large cross section of the fertilizer industry until 1945 when a split occurred and The American Plant Food Council was formed. The Council was comprised of both large and small manufacturers of mixed fertilizer and materials producers largely drawn from the membership of The National Fertilizer Association.

A desire for more efficiency on the part of the members in both organizations and a strong feeling that there should be one powerful voice for the fertilizer industry were factors behind the consolidation of The American Plant Food Council and The National Fertilizer Association under the name of the National Plant Food Institute, effective July 1, 1955.

The Institute and its predecessor organizations can "point with pride" to a history of productive service to its members, the industry as a whole, and to the over-all well being of agriculture.

In 1956 the services of the Institute were localized with the creation of regional offices at geograph-



ically strategic locations throughout the United States. The purpose of such regionalization was to provide services, projects and programs to meet the problems and conditions on a local basis, yet to keep the whole effort within the purview of the national organization. The Institute created regional Industry Advisory and Research and Education Committees to help formulate and direct its program and activities.

The record of achievements by the Institute and its predecessor organizations includes such significant milestones as:

**Agricultural Communications Awards**, the first created by a trade association to recognize the contributions of farm magazine editors, newspaper farm editors and land-grant college editorial personnel in the field of agriculture.

**Bankers Programs** designed to promote a better understanding of the role of fertilizer in a sound agricultural credit program.

**Youth Organizations**, support for three major groups, representing The Future Farmers of America, The National 4-H Club Foundation, and The National Junior Vegetable Growers Foundation.

**Chemical Control Project**, design-

ed to save the fertilizer industry several million dollars per year in plant food overages by getting uniform chemical control.

**Representation in Freight Rate Cases**, since World War II general freight rate increases have amounted to 135 per cent, potash freight rate increases have been held down to 47 per cent and phosphate rock to only 38 per cent—a service representing lower cost to members and their customers through realistic freight rates for plant foods.

**A Recorded Farm Radio News Service** was established, on a quarterly basis, and, on request, is being used by more than 1,250 stations, representing the largest farm radio network in the United States. Through these programs, voiced by the nation's leaders in the field of agriculture, millions of farmers are reached with messages emphasizing the importance of soil fertility and other factors essential to sound farming operations.

**Legislation Adversely Affecting the Welfare of the Industry and Agriculture** has been fought vigorously and effectively. A notable accomplishment was the defeat of a congressional bill, under the guise of a "National Fertilizer Program"

which would have placed an additional government agency in further competition with private competitive fertilizer industry.

**Fertilizer Industry Tours** of selected operations have been conducted for agricultural writers and scientists resulting in a better understanding of the importance of more profitable farming with fertilizer and a better knowledge of the scientific know-how, efficiency of operation, and the vast amount of capital necessary in the production and processing of plant foods.

**Intensified Soil Fertility Programs** have been established on a substantial scale and are now being extended throughout the United States with the organized cooperation of land-grant colleges, businessmen, industry leaders, agricultural communications personnel and many other groups concerned with more efficiency in farming with adequate use of fertilizer.

**Fellowships, Scholarships and Grants-in-Aid** annually are provided to establish guide posts for adequate and more efficient use of fertilizer; for training of scientific personnel to provide for the needs of both industry and agriculture, and to determine scientifically optimum levels

## Do you think Market Research is a new thing?

### WHAT FACTORS MOST INFLUENCE FARMERS' CHOICE OF COMPANY OR BRAND IN PURCHASE OF FERTILIZER?

Company Reputation  
Say These Farmers

Dealer Service  
Say These

Quality or  
Brilliant Condition  
Say These

Price per Ton  
Say These

Cost per Pound  
of Plant Food  
Say These

Each figure represents 5% of fertilizer users interviewed. Farmers were asked to indicate the most important factor.

### WHICH AGENCY IS MOST HELPFUL TO FARMERS IN SELECTING RIGHT GRADE OF FERTILIZER TO USE?

Fertilizer Dealers or Agents  
Say These

County Agent  
Say These

Agricultural Colleges  
Say These

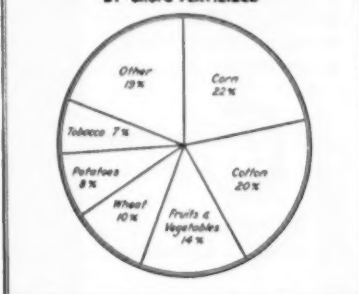
Farm Agents  
Say These

Each figure represents 5% of all fertilizer users interviewed

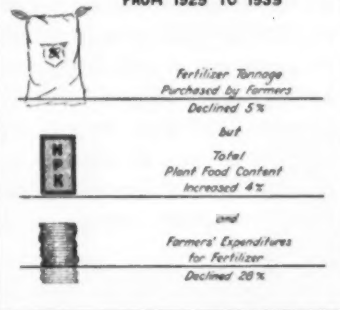
The two charts at the left, published in our 1940 YEAR BOOK, showed data from a consumer survey conducted by National Fertilizer Association and compiled as *American Fertilizer Practices—Second Survey*. The data were obtained through interviews with 32,148 farmers in 604 counties of 35 states. It is interesting to compare relative standing of the different buying influences with those determined in the regional NPFI studies a couple of years ago, and with those in the Iowa new-practice adoption studies presented by Professors Bohlen and Beal to fertilizer groups throughout the nation.

The charts below show other studies by the association. By 1939, corn had already displaced cotton as the number one fertilizer consumer, and the preceding decade had seen plant nutrient content climb four percent . . . and even then fertilizers were emerging as the farmer's best-yielding capital investment.

### DISTRIBUTION OF FERTILIZER CONSUMPTION BY CROPS FERTILIZED



### FROM 1929 TO 1939



of fertilization for crops and soils under varying climatic conditions.

**Publications** in the interest of the industry and of agricultural workers are among the most outstanding contributions; for example, "Our Land and Its Care" is the story of our soil and how to keep it productive and was produced in cooperation with the U. S. Office of Education. More than a million and a half copies have been distributed, on request, as supplementary text and as an information bulletin on soil fertility.

The **Plant Food Review** is a prac-

tical and attractive publication replete with information on better methods of farming and other articles designed for the enlightenment of agricultural leaders and workers.

**Hunger Signs in Crops**, a best seller, used as a textbook in many colleges, is a four-color, illustrated book dealing with plant food deficiency symptoms.

The **Fertilizer Salesman's Handbook**, containing 220 pages of scientific and sales information, represents the only publication of its kind yet issued.

**Visual Aids** are prominent in the

Institute's program and include feature-length motion picture films, television shorts, plant food deficiency and farm machinery slides, posters, soil improvement pamphlets. For example, the motion picture, **Making the Most of a Miracle**, embodying the story of plant nutrients, is regarded as a classic in its field, while the newest film produced as a feature for live as well as TV audiences is **Bread from Stone**, a public relations production incorporating a comprehensive review of the fertilizer industry and telling the story of the farmer's role in the national economy.

**Safety in Fertilizer Plants** has been promoted enthusiastically by the Institute and a handbook, looking toward a reduction of accidents and more efficiency in plant operations, is in process of being published.

The Institute enjoys a fine working relationship with the Association of American Fertilizer Control Officials and shares in their efforts to rigidly enforce the State Fertilizer Control Laws, in the interest of the farmer as well as the industry.

In the course of its operations, the Institute performs many other services which have become a dominant force for expanding the domestic fertilizer market.

The Institute is dedicated to the sound and practical administration of programs that are, first, worth while to farmers and next, valuable to the fertilizer industry.

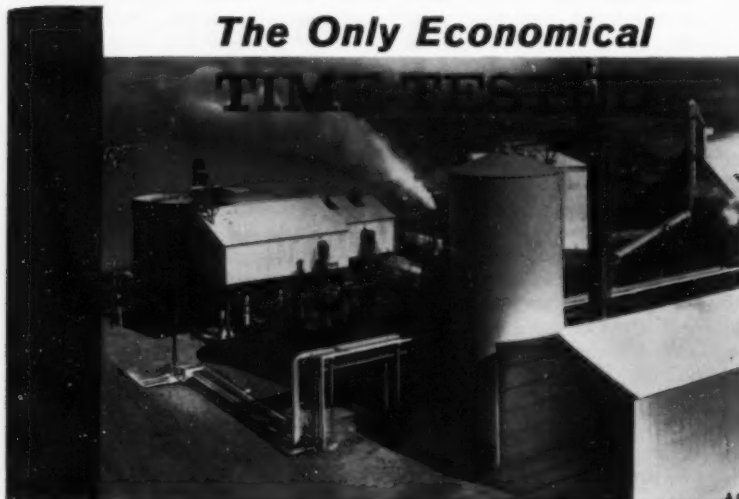
The operating policy of the organization is incorporated in this statement: "If it's not good for the farmer or in the best interests of a sound agriculture, it's not good for an industry that serves the farmer."

In seeking these objectives, the Institute emphasizes and promotes fertilizer recommendations based on scientific results of agricultural workers everywhere.

An annual convention, five regional conventions and a large number of industry-agriculture meetings are conducted or supported by the Institute, to further programs for the members and to enhance relationships with agricultural and industry leaders.

The accomplishments of the Institute and its predecessor organizations would not have been possible without the solid support of a major cross section of the fertilizer industry. The present practical and effective programs can be made more productive by a full participation by the industry as a whole.

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# American Chemical Society's

by  
WALTER H. MACINTYRE\*

## Fertilizer and Soil Chemistry

### Division

## Celebrated Golden Anniversary

in 1958

Fertilizer Chemistry was one of the four major divisions authorized by the American Chemical Society in 1908, and organization of it was perfected in 1939, when F. B. Carpenter became chairman, with J. E. Breckenridge as secretary.

In the initial title of the Division, the word "Fertilizers" was intended to connote "mixed goods," a material predominantly superphosphate that came into manufacture in 1846, through U.S. patent 6234. Thus, the manufactured fertilizer was distinguished from Guano, the bird-deposit accumulations from arid islands off the coast of Peru. Large importations of that natural manure had begun in 1830, or 16 years before the advent of "Fertilizers."

At its Fall and Spring meetings between 1909 and 1916, the Division registered small attendance and little achievement. Because of its peculiar problems and its personnel, the Division almost "segregated" itself during that interim, and, at the 1916 fall meeting, it was decided to discontinue spring meetings. Because of the activities of the industry during that season the fertilizer chemists often found conflicting obligations that precluded their participation in the spring meeting of the Division.

An advantage in the concentration of the annual activities into fall meetings was more time to develop better programs. Opportunity afforded also for contacts between the industrial personnel of the Division and the State Chemists and Control Officials during the near-by 3-day meetings of the Association of Official Agricultural Chemists.

The inauguration of research in industrial laboratories has been reflected by the substantial increase in the attendance at the annual meetings and through the quality of the technical contributions. Of its enrollment of 1600, current attendances are from 500 to 600. The rejuvenation of the expanded Division

was due, in large measure, to the phosphate and ammonia papers presented to its programs and symposia by personnel of the Chemical Engineering Department of T.V.A. That group of scientists was gathered by Harry A. Curtis, who had also directed the inauguration of Chemical Engineering curricula at Yale University. When he became chief chemical engineer of T.V.A., he inaugurated an intensive attack upon thermal processings of rock phosphate. He also induced the Chemistry Department of the Agricultural Experiment Station of the University of Tennessee to collaborate in researches upon T.V.A. experimental phosphates, fluorides, and slag, and in collateral studies by means of X-ray, greenhouse cultures and chemical analyses of vegetation, soils, atmosphere, lysimeter leachings, rain and pond waters.

The course and history of the Division can be considered as of two durations. In the first of these the industry did not provide adequate

facilities to support research, nor inspiration nor incentive to potential research personnel. Throughout that span there was only a small infiltration of Federal, College, University, and Experiment Station workers into the meetings of the Division.

The second phase of the Division's history is characterized by aroused appreciation of the need for fertilizer research in both industrial and academic organizations. There was new interest in and appreciation of the opportunities for postulations, trials, and pilot plant proof for productions of standard and thermally-induced types of phosphates. Ammoniation had become important. Recognized also was the unlimited scope of the role of additives of the so-called "trace" or "less abundant" elements, such as zinc, copper, magnesium, molybdenum, pollutants (fluorine in particular), upon vegetation, soil and surface waters.

Thus came a challenge to the chemists of the industry, universi-

### The Division's Officers Through the Years

Year	Chairman	Vice Chairman	Secretary-Treasurer
1909-10	F. B. Carpenter	—	J. E. Breckenridge
1911-12	Paul Rudnick	—	J. P. Street
1913	Paul Rudnick	—	J. E. Breckenridge
1914-15	J. E. Breckenridge	—	E. L. Baker
1916	J. E. Breckenridge	—	F. B. Carpenter
1917	J. E. Breckenridge	—	L. L. VanSlyke
1918	J. E. Breckenridge	—	J. B. Carpenter
1919-27	F. B. Carpenter	—	H. C. Moore
1928-37	E. W. Magruder	—	H. C. Moore
1938-39	E. W. Magruder	—	H. B. Siems
1940-46	H. B. Siems	—	C. A. Butt
1947	C. A. Butt	—	J. B. Hester
1948-49	J. B. Hester	—	Vincent Sauchelli
1950-51	Vincent Sauchelli	—	S. F. Thornton
1952	S. F. Thornton	A. L. Mehring	J. D. Romaine
1953	A. L. Mehring	J. D. Romaine	G. H. Serviss
1954	J. D. Romaine	G. H. Serviss	G. L. Bridger
1955	G. H. Serviss	G. L. Bridger	S. B. Randle
1956	G. L. Bridger	S. B. Randle	K. G. Clark
1957	S. B. Randle	K. G. Clark	M. D. Sanders
1958	K. G. Clark	M. D. Sanders	T. P. Hignett
1959	M. D. Sanders	T. P. Hignett	John O. Hardesty
1960	T. P. Hignett	John O. Hardesty	L. B. Hein

\* Dr. MacIntyre, emeritus head of the Chemistry Department, University of Tennessee Agricultural Experiment Station, is presently an agricultural chemistry consultant living in semi-retirement at St. Petersburg, Fla. This history of the ACS Fertilizer Chemistry (now Fertilizer and Soil Chemistry) Division, which he offered to Commercial Fertilizer especially for this anniversary issue, is based on a presentation of the Division's history which he made at their 1958 meeting.



ties, experiment stations and federal agencies, U.S.D.A., T.V.A., and T.V.A.-U.T. in particular. Substantial participation of personnel from those agencies was reflected progressively in the larger attendance of those assigned to membership of the Division.

A development in the second phase of the Division was the recognition of the value of subjective symposia. In a 1926 symposium the late lamented Charles A. Browne presented a comprehensive treatise on the history and achievements of agricultural chemistry, forerunner to a series of symposia upon potash;

boron; nitrogen; calcium; magnesium; phosphate processing and sulfur. Such participation brought papers of high academic value and developed informative symposia.

At the 1951 meeting of the Division in New York, it was voted that the Division should be designated as "Fertilizer and Soil Chemistry" and the Society's Council approved that title in July 1952. The reason for the inclusion of the word "Soil" was obvious and imperative. The differential activities of the various components of mixed fertilizers, nitrogen, phosphorus, sulfur, potassium, and amendments after incor-

poration were of vital importance to producers and users. Of particular importance was recognition of the correlary effects of supplements of limestone, dolomite, and slag. Consequently, the contributions to the jointly designated sessions and symposia became more and better, especially through the reports from research workers in the several state and federal agencies. Contributions to the soil phase of the expanded division dealt with the chemically and biochemically induced transitions, "leachability," fixations of conventional additives and their effects upon plant response and composition. Full recognition was accorded also to the importance of additive trace elements, soil conditioners, herbicides and pesticides.

The operations of the Division have served remarkably and effectively as opportunities for helpful exchanges between the workers in U.S.D.A., T.V.A., participating universities, the augmented chemical personnel of the industry, and contributors to the research program of the Association of Official Agricultural Chemists.

Many of the achievements by U.S.D.A. in the chemistry of fertilizers and soils have been presented to the Division and references to them are listed in the papers "U.S. D.A. and Fertilizer Technology," "U.S.D.A. Fertilizer Technology Research since 1950," and in "Twelve Decades of Commercial Fertilizers," with 125 citations as the presidential address to the 1957 annual meeting of A.O.A.C.

In the programs of the early years of the Division, the participating personnel was preponderantly from the industry. Consequently, chief considerations were those of manufacturing operations, sampling, economic problems, and analytical techniques.

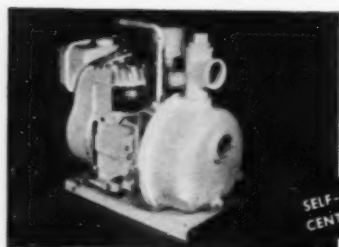
The history of the Division provides an informative recording of the transition of an essential industry subsequent to the exactness through which it is charted from chemical findings and their implementation. In early days the manufacture of commercial fertilizers was chiefly mechanical operations; today the industry is veritably under chemical control. For the other half of its existence, the history of the Division is characterized by the increase in academic contributions from a larger proportion of research workers in fertilizers and soils, from educational institutions, and from state and federal agencies, as well as from industrial laboratories.



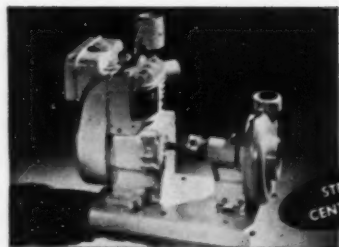
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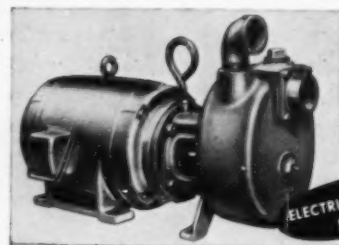
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WATERLOO, IOWA



## Fifty Years of Our Mastheads

Beginning with the grandiloquent line in August 1910: "Thus chemical science shall make the desert bloom as the rose," our cover designs have come up to date progressively until the very modern one which heads this month's cover. The spirit of the times is reflected in each of these, for even art has changed its character in this past half century. There will be nostalgia for many of our readers in this parade of covers.

Our first cover, fifty years ago this month.



The vegetables vanished with this February 1921 cover.



This style first appeared in September 1925, and the Green Book line was added in February 1933.



In April 1944, modernization began to show.



January 1945: another fresh approach appeared.



This cover, begun in April 1945, lived until last month.



## Cartoon Crusades

The two cartoons below, depicting a diehard and a progressive farmer of that day, came from our October, 1910 issue, and illustrated one of a series of articles pointing out the inherent faults in farmers home-mixing their own fertilizers.

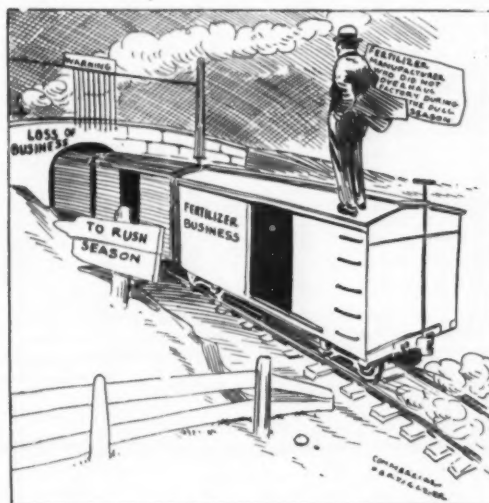


We'll I'll be ding swizzled  
Where is them crops at?  
That's what I "want to know"  
I mixed that FERTILIZER myself by drat,  
But the darned crops didn't grow.



Experience has long since taught me  
That "Science" beats "guess work"  
All to smash.  
I used the BEST FERTILIZER money would buy,  
And my crops are piling up the cash.

This timely cartoon from our July 1911 issue points out the "fate of the manufacturer who trifles away the 'between seasons' time and waits until the last moment to order necessary machinery, equipment or supplies of any kind." Times may have changed, but people seem to still be pretty much the same, don't they?



THE COMING LOW BRIDGE.

# Fifty-year tonnage gains impressive, offer industry a challenge for future

There's no doubt about it, our industry has made impressive gains in these fifty years . . . whether you look at it as a simple tonnage gain or as a plant nutrient increase.

The table on page 43 tells a part of the story. Worked up by your editors from statistics in our old issues along with more recent material from National Fertilizer Association (now merged into National Plant Food Institute) and from USDA's Fertilizer Investigations Research Branch, this table shows consumption by five-year averages from 1910 to 1959.

U. S. fertilizer consumption in 1910 (calendar year) was 5,757,055 tons according to a tabulation our magazine made in 1925 covering the preceding fifteen years. USDA's preliminary report for the year ending June 30, 1959 indicates a total of 25,143,000 tons—nearly four and a half times the 1910 figure.

Even more impressive is the gain

in plant nutrient consumption. Nitrogen was pegged at 146,000 tons for 1910,  $P_2O_5$  at 499,000 tons and  $K_2O$  at 211,000 tons, for a total nutrient use of 856,000 tons. In the fiscal year ending in 1959, 2,643,000 tons of nitrogen were consumed, 2,576,000 tons of  $P_2O_5$  and 2,177,000 tons of  $K_2O$ ; this figures to a nutrient consumption of 7,396,000 tons. So we show a nutrient usage nearly nine times what it was fifty years ago.

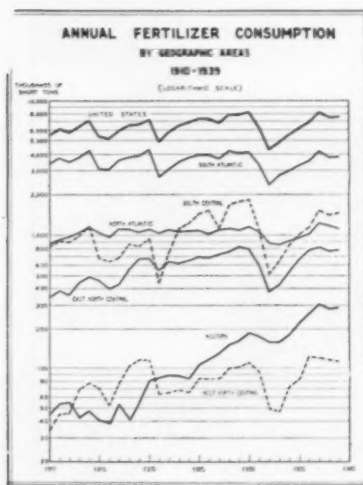
Thus the fertilizers we are using today are about twice the concentration in actual plant food as those used half a century ago.

While the figures cited above, and those used in the table on page 43, include both mixed goods and direct-application materials, let's also take a look at what has happened to our mixed fertilizers themselves. Through the use of more concentrated fertilizer materials, and

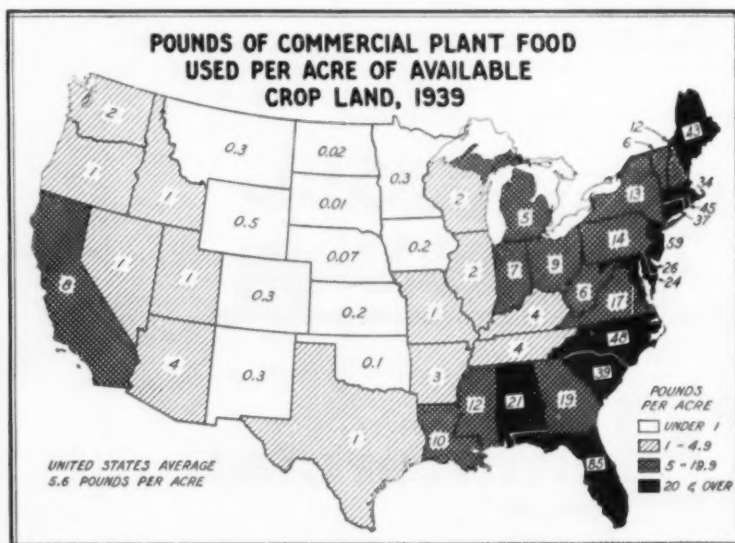
through a reduction in the addition of filler materials in mixtures, we've upgraded the average analysis from 14.8 units of plant food to 30.9 units in these fifty years, nearly 110% increase. In the thirty years between 1880 and 1910, the gain had been scarcely ten percent, from 13.5 units to 14.8.

The average analysis of mixed fertilizers in 1910 was, in terms of  $N-P_2O_5-K_2O$ , 2.1-9.3-3.4. For the fiscal year ending in 1959 it was 6.2-12.76-11.94. Potash was the biggest gainer, registering a total more than three and one half times the 1910 average. Nitrogen was close behind with a figure nearly three times 1910's, and  $P_2O_5$ —which accounted for more than 60% of the average plant nutrient content fifty years ago—is about one and one-third times as high as in our 1910 grades, although it is still the leading nutrient in our mixed goods today.

Here's a graph from our 1940 YEAR BOOK, prepared by NFA, showing annual fertilizer consumption by regions for 1910-1939. These regions can't be accurately compared with those in our table on the opposite page, nor with USDA's consumption tables, as the areas are now broken down differently, but you'll find it interesting.



This map chart by NFA, also from our 1940 YEAR BOOK, should be an eye-opener to many of the industry's newcomers. You may find it amusing to compare the figures with the most recent you have for your own state, although most present-day analyses are based on acres of cultivated cropland rather than 'available' acreage.



Average Annual Fertilizer Consumption by Five-Year Periods, 1910-1959

States and Regions	1910-14	1915-19	1920-24	1925-29	1930-34	1935-39	1940-44	1945-49	1950-54	1955-59
Maine	113,760	118,968	168,275	176,030	163,730	134,000	170,200	261,207	195,848	179,132
New Hampshire	15,050	15,766	15,800	16,271	11,800	13,800	15,822	25,604	20,863	19,044
Vermont	13,040	15,400	17,200	16,696	13,095	17,941	14,899	49,095	50,804	55,630
Massachusetts	48,140	60,400	62,819	65,252	61,250	67,022	71,136	87,179	88,355	84,668
Rhode Island	7,300	8,900	8,860	9,485	7,700	10,840	12,725	18,621	15,712	16,532
Connecticut	54,200	75,200	71,000	68,071	54,647	57,324	65,653	85,908	88,586	80,493
<b>New England</b>	<b>251,490</b>	<b>294,634</b>	<b>343,954</b>	<b>351,875</b>	<b>312,222</b>	<b>300,927</b>	<b>350,435</b>	<b>527,613</b>	<b>460,168</b>	<b>435,499</b>
New York	257,580	284,972	246,000	261,400	273,000	320,375	399,949	562,325	618,910	608,980
New Jersey	142,415	152,408	163,011	141,803	142,094	168,399	206,916	252,446	257,003	254,344
Pennsylvania	331,123	319,996	320,970	331,252	272,534	339,874	380,127	520,477	620,802	660,564
Delaware	36,600	44,880	42,541	41,407	35,332	38,609	39,324	53,600	76,830	88,805
District of Columbia	400	500	620	880	920	1,520	1,960	2,040	2,320	3,390
Maryland	163,670	172,280	155,006	166,507	145,471	169,539	184,260	239,573	283,273	297,307
West Virginia	30,680	32,260	36,468	45,380	41,700	44,400	46,078	88,123	92,362	79,749
<b>Middle Atlantic</b>	<b>962,468</b>	<b>1,007,296</b>	<b>964,616</b>	<b>988,629</b>	<b>911,051</b>	<b>1,082,716</b>	<b>1,258,614</b>	<b>1,718,574</b>	<b>1,931,500</b>	<b>1,993,139</b>
Virginia	385,353	424,769	429,785	432,496	350,391	405,742	443,146	661,312	799,469	773,684
North Carolina	750,252	806,023	1,012,353	1,250,086	941,559	1,119,246	1,250,858	1,598,566	1,820,612	1,672,434
South Carolina	984,826	890,759	752,361	797,696	589,583	670,205	760,607	911,539	953,532	847,027
Georgia	1,146,284	884,832	683,013	804,868	587,541	725,287	908,997	1,159,123	1,332,700	1,313,363
Florida	199,709	216,737	334,066	414,103	412,904	512,826	659,916	916,499	1,225,766	1,394,347
<b>South Atlantic</b>	<b>3,466,424</b>	<b>3,223,120</b>	<b>3,211,578</b>	<b>3,699,249</b>	<b>2,881,978</b>	<b>3,433,306</b>	<b>4,023,524</b>	<b>5,247,039</b>	<b>6,132,079</b>	<b>6,000,854</b>
Ohio	165,652	220,650	298,058	319,734	243,673	335,135	453,015	784,635	1,017,019	1,062,754
Indiana	177,654	185,930	204,004	230,720	156,180	216,976	341,978	723,294	1,026,272	1,111,752
Illinois	6,200	9,800	14,991	28,875	25,099	33,603	94,426	358,738	746,005	1,387,160
Michigan	48,786	78,300	92,116	126,919	99,093	131,799	205,680	397,045	564,572	657,250
Wisconsin	3,300	6,800	13,800	24,946	31,865	38,505	109,326	334,399	390,288	436,645
<b>East North Central</b>	<b>401,392</b>	<b>501,480</b>	<b>622,969</b>	<b>731,194</b>	<b>555,910</b>	<b>756,018</b>	<b>1,204,425</b>	<b>2,598,111</b>	<b>3,744,228</b>	<b>4,655,560</b>
Minnesota	1,800	3,600	6,000	11,787	11,939	12,059	30,823	167,922	244,647	430,446
Iowa	1,100	3,700	9,240	13,319	8,818	34,463	251,019	460,422	547,932	547,932
Missouri	47,326	68,800	58,596	60,149	43,972	74,704	97,515	328,131	522,912	796,942
North Dakota	20	160	375	690	750	2,460	15,972	32,996	90,333	90,333
South Dakota	20	145	194	120	160	500	5,665	15,255	32,664	32,664
Nebraska	140	470	560	400	957	2,220	23,977	112,297	208,998	208,998
Kansas	4,910	10,107	6,111	7,758	3,824	13,240	20,675	91,995	193,687	228,336
<b>West North Central</b>	<b>54,036</b>	<b>83,787</b>	<b>75,182</b>	<b>90,063</b>	<b>74,264</b>	<b>110,688</b>	<b>188,636</b>	<b>884,681</b>	<b>1,582,215</b>	<b>2,335,651</b>
Kentucky	69,200	94,200	82,400	87,700	79,039	101,990	160,331	482,131	580,749	543,210
Tennessee	75,739	98,094	94,731	140,891	103,061	122,744	193,087	412,056	570,062	539,710
Alabama	476,829	261,249	346,444	609,686	383,100	522,062	646,320	882,056	1,100,485	1,064,450
Mississippi	131,235	90,500	149,871	283,202	190,378	284,592	395,624	542,355	720,213	708,319
<b>East South Central</b>	<b>753,003</b>	<b>544,043</b>	<b>673,446</b>	<b>1,121,879</b>	<b>755,578</b>	<b>1,031,388</b>	<b>1,395,362</b>	<b>2,318,598</b>	<b>2,971,309</b>	<b>2,855,688</b>
Arkansas	51,370	60,665	62,451	121,604	60,171	59,832	135,876	219,099	383,893	333,194
Louisiana	88,880	89,372	90,278	127,194	91,427	135,197	188,608	246,776	307,771	295,780
Oklahoma	1,500	3,000	3,220	6,461	4,720	7,029	14,252	84,157	151,139	122,300
Texas	56,977	40,369	63,504	128,691	66,750	79,251	157,172	407,969	574,862	616,205
<b>West South Central</b>	<b>198,727</b>	<b>193,406</b>	<b>219,453</b>	<b>382,950</b>	<b>223,068</b>	<b>281,309</b>	<b>495,908</b>	<b>958,001</b>	<b>1,417,665</b>	<b>1,367,480</b>
Montana	870	4,154	5,160	12,600	21,400	36,158	97,452	12,278	64,010	36,431
Idaho	60	340	464	1,920	5,186	10,920	57,470	64,810	97,452	97,452
Wyoming	270	690	1,522	2,060	4,692	8,760	12,278	64,010	36,431	36,431
Colorado	60	230	544	1,715	2,694	7,715	29,417	45,343	64,010	64,010
New Mexico	20	400	780	1,384	1,109	2,112	4,278	12,148	20,707	36,431
Arizona	300	425	780	2,320	6,279	12,683	40,239	108,744	181,108	181,108
Utah	60	300	510	1,560	1,990	3,670	15,644	27,784	35,575	35,575
Nevada	28	30	148	500	440	1,350	2,858	6,065	6,065	6,065
<b>Mountain</b>	<b>20</b>	<b>880</b>	<b>2,103</b>	<b>4,050</b>	<b>10,332</b>	<b>24,437</b>	<b>46,926</b>	<b>173,560</b>	<b>300,406</b>	<b>473,275</b>
Washington	1,300	2,100	5,400	14,490	18,900	24,630	41,000	87,685	101,206	208,594
Oregon	3,960	6,700	6,900	9,300	11,780	16,260	24,879	74,457	115,834	190,680
California	43,234	35,998	70,384	106,793	135,337	209,123	300,371	544,615	768,210	2,127,813
<b>Pacific</b>	<b>48,494</b>	<b>44,798</b>	<b>82,684</b>	<b>130,583</b>	<b>166,017</b>	<b>250,013</b>	<b>366,250</b>	<b>706,757</b>	<b>985,250</b>	<b>2,527,098</b>
<b>UNITED STATES</b>	<b>6,136,251</b>	<b>5,893,444</b>	<b>6,195,985</b>	<b>7,501,002</b>	<b>5,890,420</b>	<b>7,270,802</b>	<b>9,330,094</b>	<b>15,132,945</b>	<b>19,525,022</b>	<b>22,644,246</b>

Data in this table were derived from COMMERCIAL FERTILIZER surveys, National Fertilizer Association tabulations, and U. S. Department of Agriculture statistics. State totals may not add exactly to regional totals, nor regional to national, due to rounding-off of five-year averages to nearest whole number.

Some of the earlier data were based on estimates of state officials and fertilizer manufacturers. 1910-1954 figures are on a calendar years basis; 1955-1959 based on fiscal years ending June 30; 1958-59 tonnages used were preliminary totals. Tonnages used for 1940-1943 include commercial sales only, and not government distribution.

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**CHAIN BELT COMPANY**

## REX IS BEST...IN THE USER TEST



Here's an interesting report,  
reprinted in full from our February 1912 issue,  
quoting replies to a tonnage-survey inquiry  
sent out by COMMERCIAL FERTILIZER'S editors.  
You'll find many of the replies informative,  
others surprising, but all interesting . . .

## Fertilizer Consumption for Years Past in Various States

*Commercial Fertilizer* recently addressed a letter to the agricultural departments of every State of the Union, inquiring the number of tons of fertilizers consumed in each State for the past 30 years and asking for a few facts and statistics regarding the first establishment of fertilizer plants in the respective States. The answers received are given alphabetically by States below, save in the case of a number of States replying which have no records of the kind, and for the most part, use little or no commercial fertilizers.

In this connection, it is a singular fact that the laws of some States that consume a good deal of fertilizer require absolutely no official record of tonnage or concrete statistics bearing on the local industry, in most instances simply registering the brands for taxation and inspection, most of these being interstate shipments. Even such States as New York, Massachusetts and Indiana are deficient in this regard.

The States replying, in alphabetical order, follow:

### CALIFORNIA

We have no fertilizer statistics for California prior to 1903, which was the year of the beginning of the State Fertilizer Inspection. Previous to that time sales of commercial fertilizer were doubtless exceedingly limited for a number of reasons, but the growth has been very great since that time. Herewith tabulated figures for the past nine years:

1903-04	9,790
1904-05	10,080
1905-06	16,920
1906-07	21,650
1907-08	31,200
1908-09	35,322
1909-10	36,634
1910-11	49,764

### COLORADO

About one hundred tons of commercial fertilizer from January 1, 1910, to January 1, 1911.

### CONNECTICUT

No means of ascertaining the number of tons of fertilizer used in this State. The different manufacturers decline to

give the figures of their individual sales, which is the only way here of determining the amount.

Cannot give you the date of the establishment of the first fertilizer plant in this State. Probably the first industry of the kind was the partial drying of fish scrap from which Menhaden oil had been pressed. That was certainly prior to 1870.

A man named Coe started a fertilizer factory in Middleford, Conn., early in the fifties. The Quinnipiac Co., which still exists as one of the allied companies of the A. A. C., was the first to make fertilizer on any considerable scale.

### DELAWARE

For 1910 this State used twenty thousand tons of fertilizer, and for 1911, twenty-three thousand.

### GEORGIA

The following table gives the number of Fertilizer and Cottonseed Meal Tags, respectively, sold by the Georgia Department of Agriculture, for the past ten seasons:

	Fertilizers:	C. S. Meal:
Season 1900-1	482,571 Tons,	58,076 Tons
Season 1901-2	443,997 Tons,	74,130 Tons
Season 1902-4	555,414 Tons,	84,468 Tons
Season 1903-4	618,730 Tons,	96,818 Tons
Season 1904-5	622,414 Tons,	90,328 Tons
Season 1905-6	743,424 Tons,	87,253 Tons
Season 1906-7	728,361 Tons,	87,703 Tons
Season 1807-8	766,166 Tons,	85,298 Tons
Season 1908-9	807,832 Tons,	103,532 Tons
Season 1909-10	1,030,699 Tons,	103,302 Tons
Season 1910-11	1,202,722 Tons,	129,748 Tons

### IOWA

There is almost no commercial fertilizer used for the production of our common farm crops, and a very limited amount indeed is used for truck farming around some of our larger towns. Taking the State as a whole, however, the

*continued on page 46*

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BALTIMORE 2, MD.

## LAW & COMPANY

Founded 1903  
FERTILIZER CHEMISTS

Three Convenient Laboratories  
P.O. Box 1558 Atlanta 1, Ga. P. O. Box 789 Montgomery, Ala. P. O. Box 625 Wilmington, N. C.

## Planters Fertilizer & Phosphate Co.

Manufacturers of

Sulphuric Acid, Superphosphate, Ammoniated  
Superphosphate Base, Mixed Goods.

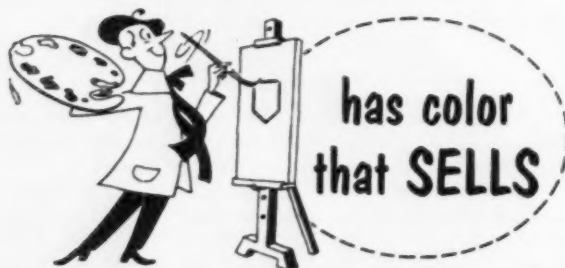
HIGH GRADE GRANULAR FERTILIZERS

CHARLESTON HEIGHTS, S. C.

Box 4857

# FUR-AG

the sterilized organic conditioner



Use Fur-Ag in your mixed fertilizers and your goods take on a rich, dark color that invites sales. It reduces bag-set, speeds up curing in the pile and provides bulk. Sterilized Fur-Ag is free from plant diseases, insects, weed seeds and it's readily available all year 'round at surprisingly low cost. For full information, write for Bulletin 127.



The Quaker Oats Company  
CHEMICALS DIVISION

345 The Merchandise Mart, Chicago 54, Illinois

## 1912 Tonnage Survey

... continued from page 45

use of commercial fertilizers here is practically a negligible factor.

### KENTUCKY

1897	16,000 to 18,000 tons
1898	25,000 to 28,000 tons
1899	30,000 to 35,000 tons
1900	35,000 to 40,000 tons
1901	32,000 to 36,000 tons
1902	40,000 to 45,000 tons
1903	30,000 to 32,000 tons
1904	32,000 to 34,000 tons
1905	35,000 to 38,000 tons

continued on page 47 . . .

Serving the

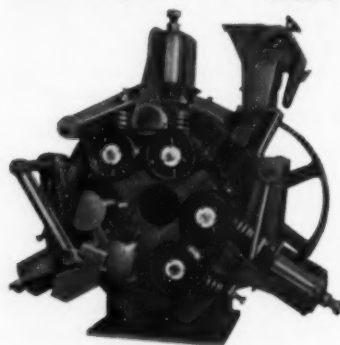
FERTILIZER INDUSTRY

## Fertilizer Equipment Sales Corp.

Designers — Engineers — Manufacturers of  
Fertilizer Machinery

Sales and engineering office:  
6295 Pleasantdale Drive  
Doraville, Ga.  
P. O. Box 9755  
Atlanta 19, Ga.  
Phone GLendale 7-0286

## Investigate the New and Improved



SIX-ROLL  
**KENT  
ABBÉ  
MILL**

- Six Grinding Rolls instead of three.
- Grinds 8 tons per hour of limestone to a fineness of 97% minus 100 mesh; 10-12 tons per hour of Florida pebble phosphate rock to a fineness of 87% minus 100 mesh.
- Also grinds gypsum, barytes, ores and other friable materials.

Ask for Bulletin K-2.

CRUSHING • GRINDING • PULVERIZING • AIR SEPARATING MACHINERY

KENT MILL DIVISION

**abbé ENGINEERING COMPANY**

420 Lexington Ave., New York 17, N. Y.

# 1912 Fertilizer Tonnage Survey

... continued from page 46

1906	43,000 to 45,000 tons
1907	46,000 to 48,000 tons
1908	32,000 to 35,000 tons
1909	42,000 to 43,000 tons
1910	55,000 to 58,000 tons
1911	60,000 to 65,000 tons

## LOUISIANA

Season 1889-1890	11,120 tons
Season 1891-1892	7,945 tons
Season 1893-1894	8,496 tons
Season 1895-1896	10,051 tons
Season 1897-1898	14,404 tons
Season 1899-1900	31,813 tons
Season 1901-1902	53,874 tons
Season 1903-1904	95,964 tons
Season 1905-1906	84,626 tons
Season 1907-1908	84,124 tons
Season 1909-1910	88,396 tons
Season 1890-1891	11,371 tons
Season 1892-1893	12,047 tons
Season 1894-1895	4,783 tons
Season 1896-1897	12,542 tons
Season 1898-1899	23,866 tons
Season 1900-1901	47,943 tons
Season 1902-1903	76,197 tons
Season 1904-1905	94,729 tons
Season 1906-1907	102,454 tons
Season 1908-1909	83,710 tons
Season 1910-1911	91,085 tons

## MAINE

Absolutely no data relative to the sale of fertilizers. There is comparatively little fertilizer manufactured in Maine, and do not know the exact date on which the first fertilizer plant was established in this State.

The license in Maine is based upon a brand tax and not upon a tonnage tax, consequently the Station has no means of knowing anything relative to the amount of shipments.

## MASSACHUSETTS

Value in 1910, \$1,931,000; in 1900, \$1,231,000. We have no means of knowing the exact average price, but should judge it must be in the neighborhood of \$30 per ton.

Cannot tell the precise year when the first fertilizer factory in the State was established, but think it was the factory for the manufacture of superphosphate in Weymouth, which was put in by the Bradley Fertilizer Co., Boston.

## MICHIGAN

In the past six years the consumption has increased from approximately 20,000 tons to 40,000 tons. We have no way of determining with any degree of accuracy the annual consumption and the figures given are the estimates of some of the manufacturers and are fairly reliable.

## MINNESOTA

Practically no commercial fertilizers are used in Minnesota. Swift & Company, in connection with their packing plant in St. Paul, have been producing the animal fertilizers

for some time, probably fifteen years or more. They are used to a very limited extent in the State and no record of tonnage put out is kept. Barn-yard manures are our standard fertilizers.

## MISSISSIPPI

### Fertilizer Tags Sold and Exchanged

Season		Season	
1892-1893—	25,994.10 tons	1893-1894—	23,894.10 tons
1894-1895—	17,683.30 tons	1895-1896—	31,869.35 tons
1896-1897—	40,912.40 tons	1897-1898—	47,906.40 tons
1898-1899—	39,886.60 tons	1899-1900—	66,667.00 tons
1900-1901—	66,174.00 tons	1901-1902—	77,857.90 tons
1902-1903—	81,892.25 tons	1903-1904—	137,942.45 tons
1904-1905—	114,260.45 tons	1905-1906—	128,467.95 tons
1906-1907—	138,669.75 tons	1907-1908—	143,191.90 tons
1908-1909—	139,884.10 tons	1909-1910—	132,776.70 tons
Season 1910-1911—	148,237.00 tons		

### Cottonseed Meal Tags Sold and Exchanged

1906-1907—	47,698.00 tons	1907-1908—	57,720.45 tons
1908-1909—	67,126.50 tons	1909-1910—	56,731.50 tons
Season 1910-1911—	64,102.25 tons		

## NEBRASKA

Commercial fertilizers are not used to any large extent. We are carrying some co-operative experiments with farming regarding the use of various fertilizers, including farm manures. A few truck and fruit growers are using commercial fertilizers, but it is on such a small scale that we are giving it little attention.

The most immediate thing in Nebraska in the line of fertilizers is to increase, or at least maintain, the organic matter content and at the same time improve the physical condition of the soils. Some of the better farmers are about ready to use commercial fertilizers to advantage.

## NEVADA

No record of fertilizers used in this State, there being no State control. The Nevada Packing Co., Reno, Nevada, manufactures fertilizers from their packing house products, and the Western Gypsum Co., Reno, Nevada, is putting gypsum on the market. These are the only fertilizer plants in the State. The former has been operating from six to eight years, and the latter from two to three years.

## NEW JERSEY

No figures which would give the tonnage used in any year. We estimate, however, that at the present time we are consuming from 125,000 to 150,000 tons per year.

## NEW MEXICO

New Mexico has no plant for the manufacture of commercial fertilizers. So far as we are aware there has never been a ton of mixed fertilizer shipped into this State. There are absolutely no State laws that would regulate the sale of fertilizers. Fertilizers of any kind are very seldom used. The barn-yard manure is used to fill the "chuck holes" in the roads, and not one farmer in a thousand goes to the expense of applying it to his soil. There are enormous deposits of bat guano in certain parts of the State, and a great deal of this is now being shipped to California for use on the citrus groves of the State. An occasional farmer uses it here, but very seldom. It has been reported that some acid phosphate has been used in the past year or so in the Pecos Valley, in the Southwestern part of the State, with great success but only a very few tons.

continued on page 49 . . .

# 1912 Fertilizer

## Tonnage Survey

... continued from page 47

### NORTH CAROLINA

1891-131,692 tons	1901-1902-330,714 tons
1892-104,692 tons	1902-1903-376,587 tons
1893-145,466 tons	1903-1904-432,720 tons
1894-131,242 tons	1904-1905-433,785 tons
1895-114,208 tons	1905-1906-478,564 tons
1896-187,438 tons	1906-1907-459,166 tons
1897-222,548 tons	1907-1908-507,842 tons
1898-1899-244,808 tons	1908-1909-512,726 tons
1899-1900-276,238 tons	1909-1910-630,905 tons
1900-1901-339,941 tons	1910-1911-711,380 tons

### NORTH DAKOTA

There were practically no commercial fertilizers used in North Dakota during the past year.

There have been repeated requests for information concerning fertilizers and their use in North Dakota. One firm used, experimentally, two carloads of fertilizer in North Dakota, and perhaps altogether another additional carload was used by other parties. The results for these tests are given in the forthcoming report from this department. Altogether the season was very unfavorable for experimental work of this kind.

### OHIO

Year	Lbs. Used	Cost of Fertilizers Used
1893	88,279,477	\$1,180,448
1894	91,290,340	1,162,981
1895	126,297,999	1,529,088
1896	102,383,910	1,168,657
1897	123,146,474	1,481,583
1898	152,190,375	1,543,915
1899	178,926,948	2,299,136
1900	149,752,554	1,482,390
1901	153,816,702	1,665,610
1902	182,894,581	1,764,445
1903	189,857,217	1,784,788
1904	202,709,698	1,932,792
1905	230,615,398	2,228,190
1906	242,707,109	2,426,752
1907	236,042,803	2,433,627
1908	232,517,524	3,764,483
1909	292,767,506	3,139,702
1910	349,016,233	4,220,591

Ohio's first fertilizer law passed March 16, 1881. Unable to state when first fertilizer plant was established in the State. From records available in office of the Secretary of State, we find that the Central Ammoniated Superphosphate Company was incorporated August 4, 1874; Central Chemical & Manufacturing Co., Cincinnati, Ohio, Sept. 23, 1874; Cleveland Dryer Co., Cleveland, Nov. 3, 1874. This latter company is now part of the American Agricultural Chemical Co.

### PENNSYLVANIA

Regarding the tonnage of fertilizers used in this State for the past thirty years, it is impossible to supply this information. Inasmuch as only recently we have compelled the parties handling fertilizers within this State to report the exact amount of their tonnage. Heretofore they reported the terms as set forth in the act, which in fact were intended to

be used as a basis for the calculation of the license fee.

### SOUTH CAROLINA

1891-212,392 tons	1902- 302,335 tons
1892-144,385 tons	1903- 413,728 tons
1893-200,472 tons	1904- 426,921 tons
1894-173,395 tons	1905- 481,637 tons
1895-123,311 tons	1906- 662,688 tons
1896-199,497 tons	1907- 631,032 tons
1897-243,347 tons	1908- 680,791 tons
1898-257,393 tons	1909- 758,363 tons
1899-296,000 tons	1910- 975,039 tons
1900-292,552 tons	1911-1,048,806 tons
	1901-330,744 tons

### VERMONT

There has been, without question, a decided increase in the last thirty years in the amount of fertilizer used. In 1888, the number of brands that were offered were less than thirty, although there was no adequate machinery in those days for careful inspection. Last year there were one hundred sixty-one brands licensed, and this year apparently there will be about one hundred seventy. The present usage approximates \$600,000 annually, probably about 21,000 or 22,000 tons.

The only fertilizer plant in this State is the one at Burlington—The Burlington Rendering Co.—established about ten years ago. There is a large fertilizer jobbing house in this State, a branch of the American Agricultural Chemical Co., at Rutland, but it does not manufacture; it simply jobs.

### WASHINGTON

The use of fertilizers has been steadily growing for the last twelve years, and yet has probably not reached the total of 2,000 tons per annum.

### WISCONSIN

The consumption of fertilizers has increased gradually of late years, but is still small, being probably not much over 2,000 tons a year. The reason why only this quantity of commercial fertilizers is used in our State lies in the fact that we are largely a live-stock State and enormous quantities of concentrated feeding stuffs are imported into the State each year for the feeding of farm animals and the manure produced by these is, on the whole, carefully saved by our farmers and applied on their land. Nearly all the commercial fertilizers used are applied for special crops like truck gardening, tobacco, sugar beets, cranberries, etc.

The State fertilizer law went into effect in 1895, but the first fertilizer plant was not established in this State until three years ago at Kenosha. This is, however, only a small concern and we depend mainly on the Chicago fertilizer manufacturers, with the potash and nitrate people, to supply the small quantities of commercial fertilizers consumed annually within our borders.

### PORTO RICO

Statistics on fertilizers imported into this Island:

	From United States.		From Foreign Countries	
	Tons	Dollars	Tons	Dollars
1904	1,826	\$ 88,563	208	\$ 8,714
1905	4,173	148,653	5,282	106,000
1906	5,504	246,002	2,387	134,466
1907	6,396	274,310	631	35,598
1908	5,188	216,875	581	29,782
1909	8,566	402,586	3,104	180,835
1910	10,459	453,009	12,563	538,880
1911	10,406	459,981	13,328	582,489



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# *Honoring a 50-Year Record of Service . . . .*

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## **RAYMOND ROLLER MILLS** first in the Fertilizer Field

---

OUR hearty congratulations to COMMERCIAL FERTILIZER on its Fiftieth Anniversary, and to the Fertilizer Industry for its outstanding record of progress.

We are proud of the part we have shared in serving the Fertilizer Industry during the period of its greatest development.

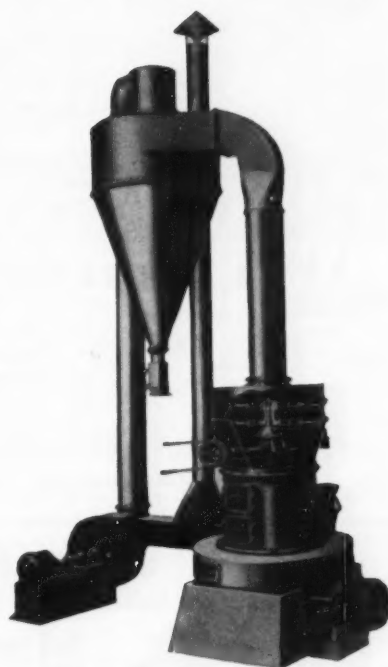
Our first advertisement appeared in an early issue of COMMERCIAL FERTILIZER in 1910, featuring, "Raymond Bros.' Pulverizing and Air-Separating Systems." See illustration below.

Just within the past fifteen years — a span of rapid growth — more than 200 Raymond Roller Mill installations have gone into service, pulverizing phosphate rock.

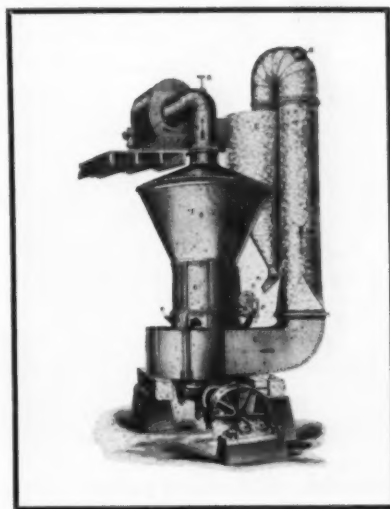
These modern mills are producing specific grades and finenesses, suitable for acidulation, acid manufacture, and direct application.

Today, the installed capacity of Raymond Roller Mills exceeds 3000 tons per operating hour, or approximately 16 million tons yearly.

For details, see  
**RAYMOND ROLLER MILL  
CATALOG No. 79F**



**RAYMOND ROLLER MILL—1960**



**RAYMOND ROLLER MILL—1910**

## **COMBUSTION ENGINEERING, INC.** *Raymond Division*

427 WEST RANDOLPH ST.  
CHICAGO 6, ILLINOIS

Combustion Engineering-Superheater Ltd., Montreal, Canada

SALES OFFICES IN  
PRINCIPAL CITIES

# ... Here are some interesting old advertisements



## Fertilizer Carts WITH Sarven Patent Wheels

Fig. 272.

**GIANT WHARF OR PHOSPHATE BARROW.**  
This is probably the strongest wooden-box barrow made. The box is made of 3-inch material with heavy sheets securely riveted to the corners. Top of box bound with iron. Braces and legs double bolted, as shown in cut. Furnished with extra heavy iron hub wheel. Size of tray, top, 23 x 30 inches; bottom, 18 x 19 inches; depth, 14 inches. Weight, each, 50 pounds.

**No. 50 BAG TRUCK.** With Stamped Steel Nose.  
The ordinary Bag Truck of this style is made with nose of cast iron; as they must be light the noses are very easily broken, being often broken in shipping.



Fig. 50.

At considerable expense we have put in special machinery for stamping the NOSES of these trucks from a **SOLID PIECE OF STEEL**, making the nose the strongest part of the truck.

Turned bearings. Length, 42 inches; width at nose, 11 1/4 inches; diameter of wheels, 6 inches; weight, each, 19 pounds; packed for export measure, 8 cubic feet per dozen. Ciphers (with iron wheels). Adverb. With rubbered wheels. With iron wheels.

## LANSING COMPANY

13 Seymour Street

FORMERLY LANSING WHEELBARROW CO.

Lansing, Mich., U. S. A.

**WAREHOUSES:** Chicago, 103 E. Lake St.; New York, 102 N. Moore St.; Kansas City, 923 Mulberry St.; Minneapolis, 330-334 N. First St.; Philadelphia, Willow and N. American Sts.; San Francisco, 338 Brannan St.; Boston, 78 Cambridge St., Charlestown Dist.

Write for Catalogue C. C.

When writing advertisers, please mention this Magazine.



Fig. 438.

### HUNG JUST RIGHT.

Box of hardwood, 34 x 46 1/4 inches on top, 22 x 24 inches on bottom; sides, 18 inches deep, inside measurements. Barrow Wheels, 36 inches diameter; tread, 1 1/2 inches; axle, 1 1/2 inches. Cipher Tarax box.

## OLIVER'S HIGH-GRADE WHITE QUARTZ ROCK

FOR PACKING ACID TOWERS

USED more extensively during the past ten years than all other brands of Quartz Rock combined. It is shipped to nearly every State east of the Rocky Mountains, being used by some, if not all, of the various plants of such companies as the Standard Oil Co., Grasselli Chemical Co., American Agricultural Chemical Co., Virginia-Carolina Chemical Co., Illinois Zinc Co., Swift & Co., Jarecki Chemical Co., F. S. Royaster Fertilizer Works, Nichols Chemical Co., Morgan & Co., Mineral Point Zinc Co., La Soli Zinc Co., Argentine Reduction Works, American Cotton Oil Co., and a great many others. All of the OLIVER QUARTZ is mined below the surface from solid ledges. It does not have the objectionable cracks to be found in all Quartz taken from or near the surface. It is obtained from what geologists claim to be the largest bed of Quartz ever known, consequently orders for any quantity of rock wanted can be filled promptly.

## FRED OLIVER

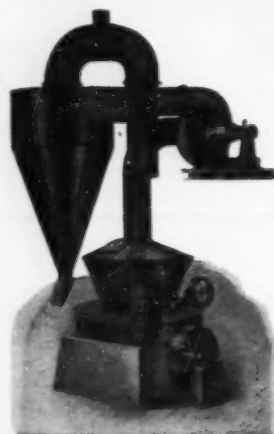
CHARLOTTE

NORTH CAROLINA

Fred Oliver boasted an impressive list of users of his quartz rock for acid towers.

Note the careful detail in the engravings in this ad for 'Georgia buggies' made in Michigan ... and the specifications were detailed enough that nothing was left to the imagination.

Fifty years ago Raymond mills for rock grinding were featured in this ad. As Combustion Engineering's Raymond Division points out in their current ad, they are still specializing.



## Fertilizer Manufacturers

You can save 10% of acid by grinding your Phosphate rock in Raymond Mills with air separators.

We have sold several of these installations to Swift & Company.

Fertilizer made from Phosphate rock pulverized by the Raymond System is finer and more uniform and contains the least insoluble matter.

In consequence, the quality of the fertilizer is increased, enabling you to get a better price for your product.

The ground rock is separated by air-suction, which eliminates screens and sieves with all their annoyances and expense. The finely ground rock will enable you to save 10% of acid in every batch and at the same time make a better product.

## Raymond Pulverizing Air-Separating Systems

are the only ones which pulverize so fine and so uniform a powder and separate it instantly and continuously and which convey simultaneously the ground product to the point of storage. These systems are installed on a guarantee to grind finer and more uniform than all others; to increase the capacity; to save operating and upkeep costs; to consume less power; to eliminate preliminary crushers and elevating and conveying machinery; to do away with bolting cloths; reels and screens; to leave no waste or tailings; to prevent dust escaping to choke and poison the workmen.

Raymond Systems are especially designed to suit the needs of fertilizer plants by our Pulverizing engineers and are built individually to meet the requirements of each factory.

## Raymond Bros. Impact Pulverizer Co.

1508 Harrison St., CHICAGO, ILL.

Designers of Special Machinery and Methods for Grinding, Pulverizing and Separating. Manufacturers of Automatic Pulverizers, Roller Mills, Vacuum Air and Screen Separators, Crushers, Special Exhaust Fans, Dust Collectors.

**REMEMBER**  
TO WRITE THE MANUFACTURER OF THE EQUIPMENT YOU WANT TO BUY. THE MANUFACTURER OF THE EQUIPMENT YOU WANT TO BUY. THE MANUFACTURER OF THE EQUIPMENT YOU WANT TO BUY.

## POWER PLANTS COMPLETE

Corliss Engines,  
Water-Tube and  
Tubular Boilers



## Murray Iron Works Co.

Incorporated Feb. 1, 1900

BURLINGTON, IOWA

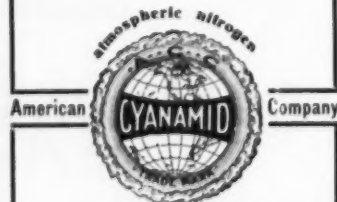
Send for Catalogue No. 65-A

Most of today's fertilizer plant superintendents don't have to run their own power plant.

American Cyanamid was our pioneer advertiser of synthetic nitrogen materials.

## CYANAMID

Is now used in  
132 FERTILIZER FACTORIES  
Can't we interest  
YOU



American

Company

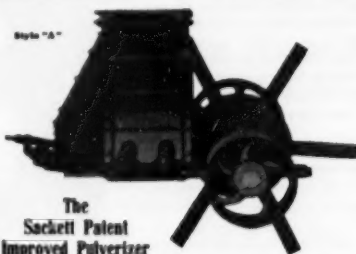
KEYSER BUILDING  
Baltimore, Maryland.

COMMERCIAL FERTILIZER

reproduced from old issues in our bound volumes.

## Fertilizer Machinery

OF SACKETT PATENTS are of the most improved type. They are built for hard service and will cut quite an item from your repair bills : : : : :



This Machine, being provided with Automatic Adjusting Shafts and Vibrating Frame, is especially adapted to the milling of Acid Phosphate and for manipulating fertilizers generally. In action, the Pulverizer consists of a series of blades or beaters, each having two cutting edges passing between Automatic Shafts at the bottom of the Hopper. The action being direct overcomes friction and gives effective results whether the tellings are soft or hard.

The front and sloping sides of the Hopper are adjusted to work automatically, to ease any foreign substance, as iron should get into the Hopper, the Automatic Adjustments will vibrate and allow the material to pass through without injuring or stopping the machine, thus dispensing with the usual loss of time in re-adjusting.

Send for Catalogue of Fertilizer Machinery.

**A. J. SACKETT, Baltimore, Md.**

The Sacketts say they are still filling parts orders for the mills featured in this 1911 advertisement.

Get a load of the price on this Sturtevant Newaygo screen advertised in 1911. The user list includes many familiar names, too.



## Newaygo Phosphate Screen

Screens 5 tons per hour with less than 1 Horse Power

Price \$300.00

Sold On Trial if not satisfactory Return

More In Use Than All Other Inclined Screens Combined

### A FEW LARGE USERS

VIRGINIA CAROLINA CHEMICAL CO.	I. P. THOMAS & SONS CO.
NIRN STEIN & CO.	GRIFFITH & BOYD
INTERNATIONAL PHOSPHATE CO.	ARKANSAS FERTILIZER CO.
ANDERSON PHOSPHATE & OIL CO.	PARNHAM FARM IMPLEMENT CO.
F. & ROYSTER GUANO CO.	IMPERIAL CO.
SWIFT FERTILIZER CO.	PIEDMONT FERT. GUANO CO.
ARMOUR FERTILIZER WORKS	MOORE FERTILIZER CO.
R. O. PAINTER FERTILIZER CO.	G. OBER & SONS CO.
RICHMOND CHEMICAL WORKS	SUFFALO FERTILIZER CO.
MILLER FERTILIZER CO.	BAUGH & SONS CO.
BARKER CHEMICAL CO.	GEORGIA FERTILIZER & OIL CO.
ACME MANUFACTURING CO.	ALABAMA CHEMICAL CO.
CARLEIGH PHOSPHATE & FERT. WORKS	NATIONAL FERTILIZER CO.
MUTUAL FERTILIZER CO.	INTERSTATE PHOSPHATE CO.
DAYABA GUANO CO.	TENNESSEE CHEMICAL CO.
PROVIDENT CHEMICAL WORKS	STUART BREWER CO.
SWAN CREEK PHOSPHATE CO.	

SEND FOR CATALOGUE

**STURTEVANT MILL CO.,**  
Boston, Mass.

August, 1960

## A Complete Service

THE strategic locations of the factories of the American Agricultural Chemical Company, as shown on the accompanying map, assure prompt, dependable service for the complete line of products listed below.

### We Manufacture

All grades of Commercial Fertilizers; Superphosphate, Agrinut Tankage, Bone Black, Gelatin, Glue, Ground Limestone, Filler Dust, Crushed Stone, Poultry Food, Tallow and Grease, and are importers and/or dealers in Nitrate of Soda, Potash Salts and Sulphate of Ammonia.

### We Mine and Sell

oil grades of Florida Pebble Phosphate Rock.



### FACTORIES

Alexandria, Va.	East Point, Ga.	Panama, Fla.
Baltimore, Md.	East St. Louis, Ill.	Portsmouth, N. H.
Belfast, Maine	Greensboro, N. C.	Savannah, Ga.
Boston, Mass.	Henderson, N. C.	Savoyport, Maine
Buffalo, N. Y.	Jacksonville, Fla.	Spokane, W. C.
Carmichael, N. J.	Montgomery, Ala.	Spring Hill, Tenn.
Cayce, S. C.	New Haven, Conn.	Tolado, Ohio
Charleston, S. C.	New York, N. Y.	Wilmington, N. C.
Cincinnati, Ohio	Norfolk, Va.	Wilmington, N. C.
Cleveland, Ohio	North Platte, Neb.	
Detroit, Mich.	Pennacook, Fla.	

## The AMERICAN AGRICULTURAL CHEMICAL Co.

420 Lexington Ave., New York City

### SALES OFFICES



Alexandria, Va.	Buffalo, N. Y.	Henderson, N. C.	Norfolk, Va.
Atlanta, Ga.	Cincinnati, Ohio	Lakeland, Fla.	St. Louis, Mo.
Baltimore, Md.	Columbus, S. C.	Montgomery, Ala.	Wilmington, N. C.
Boston, Mass.	Detroit, Mich.	New Haven, Conn.	Havana, Cuba.
	Greensboro, N. C.	New York, N. Y.	

This is not one of the earliest Agrico ads we carried, but bears a strong family resemblance to their current advertising.

In 1912 Stedman said this mixer "cannot be excelled," but they've excelled it many times over.



## Stedman's Rotary Batch Mixer

This Mixer cannot be excelled for the uniform mixing of commercial fertilizers.

¶ We are now prepared to offer same to the trade after installing five (5) of them in different plants, that are a perfect success. It is made in two sizes, for mixing one-half ton and one ton batches. It will uniformly mix after the fertilizer has passed from SCREENS to BAGGING PLANTS, and we can guarantee it will mix AMMONIATED or BASE GOODS at the DENS WITHOUT CLOGGING. INVESTIGATE the MERITS of this MACHINE before BUYING. It will PAY YOU.

¶ Write us for information regarding your requirements in the Fertilizer Machinery Line.

**Stedman's Foundry and Machine Works**  
AURORA, ILL. INDIANA

## More old ads from the dusty bound volumes





**MIXING OUTFIT**

This outfit is built entirely of steel and iron and consists of elevator with retard feeder, revolving screen, screen hopper, rotary hatch mixer, ball bearing cage mill, double bagging hopper, and two bagging scales with all spouts, as shown in the illustration, making a complete mixing unit.

Write for  
Prices and  
Other Infor-  
mation.


We were impressed by the exquisite detail in the drawing of this Atlanta Utility mixer of 1921.

In 1930 AP&C's 'an American product' marked them as the sole survivor of the many World War I-spawned saline-lake potash producers in the West.

# TRONA POTASH

93-98 percent Potassium Chloride content has made Trona Potash known for its high quality. An American product made in California.

Quotations submitted on Request



**American Potash & Chemical Corporation**  
Woolworth Building New York City

### The Part Chain Plays in Fertilizer Profits

Your fertilizer plant profits—today, next week and next year—are largely determined by the labor savings, the positive performance and long life of the elevator and conveyor chain you buy.

The more certain and lasting such chains are, the more are you protected from costly shut-downs and expensive replacements, and the lower will be your output cost in dollars per ton.

For handling acid phosphate and similar materials, Rex Combination Chain has been adopted as standard by many of America's most active fertilizer plants.

Its powerful steel side bars and amazingly tough links of "Certified Malleable Iron" provide the strength, wear resistance and constant conveyor operation that guarantee especially profitable returns.

Rex Chains, of every size and style for all types of equipment, are giving many plants the kind and length of service that annually saves many dollars. They can do the same for you.

## REX CHAIN

Rex Traveling Water Screens, Rex Concrete Mixers and Pavers, Rex Sprockets, Rex Elevators and Conveyors  
**CHAIN BELT COMPANY, MILWAUKEE**

Branch Office and Representative in Principal Cities in the United States and abroad



Rex Combination Chain operating in Rex Traveling Water Screen Plants is giving concentrated service on heavy loads of material in fertilizer plants.

The Rex Chain Company, Chain of 100,000 links of 1000 different sizes of chains in stock for every fertilizer plant.

Ruggedness was the dominant theme of this Chain Belt ad from a 1921 issue.

U. S. Potash (now merged into U. S. Borax & Chemical), initial domestic miner and refiner, had a shaft down 1000 feet and was just erecting its refinery when this 1932 YEAR BOOK ad appeared.

## U-S-Potash » » »



Mining Water Soluble Potash, 1,000 ft. below the surface at Carlsbad, New Mex.

Potash Manure Salts are now being produced from our mines near Carlsbad, New Mexico; and shipments can be made promptly.

High-grade Refined Murate of Potash will be offered to the trade on completion of our new Refinery, in the Fall of 1932.

**United States Potash Co.**  
342 Madison Avenue  
New York



# HOW TO GET THE MOST FOR YOUR MACHINERY DOLLAR

## Before You Buy, Check Sturtevant's Answers to These Key Questions

**Q - How much experience is built into the design?**

**A -** You get the benefit of 84 years of practical experience in each Sturtevant machine you buy. Unrivalled for fertilizer and insecticide plant engineering know-how, Sturtevant originated the 'Unit' idea. Whether your need is for a replacement pulverizer or mixer, or a completely modern granulating unit, Sturtevant-engineered machinery always can be depended upon to fit your requirements like a glove.

**Q - Is the machinery engineered for peak-load efficiency?**

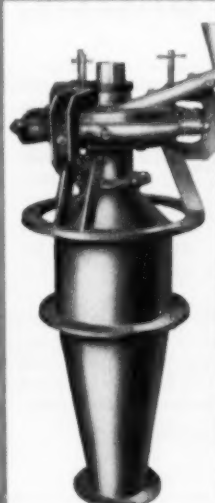
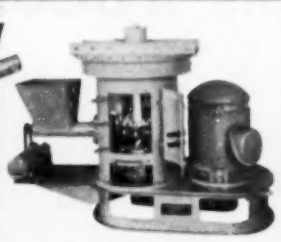
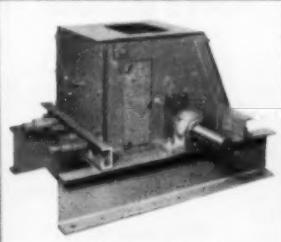
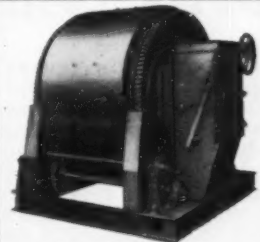

**A -** All details in each Sturtevant machine have been proved by years of peak-load performance. Rugged construction that withstands the most slam-bang use, gears designed to always perform dependably, bearings that stand up under the heaviest loads, all can be taken for granted in Sturtevant machinery. Many Sturtevant

machines have been operating at top capacity and efficiency for well over a quarter of a century.

**Q - How accessible is the machinery for clean-outs and repairs?**

**A -** Clean-outs are a constantly recurring problem in the operation of fertilizer and insecticide plants. And minor repairs on hard-to-get-at machinery can consume hours of costly man and production time. Sturtevant's practical "Open-Door" design guarantees quick accessibility — for clean-outs and repairs. Any parts requiring cleaning or maintenance are quickly exposed by "One Man in One Minute."

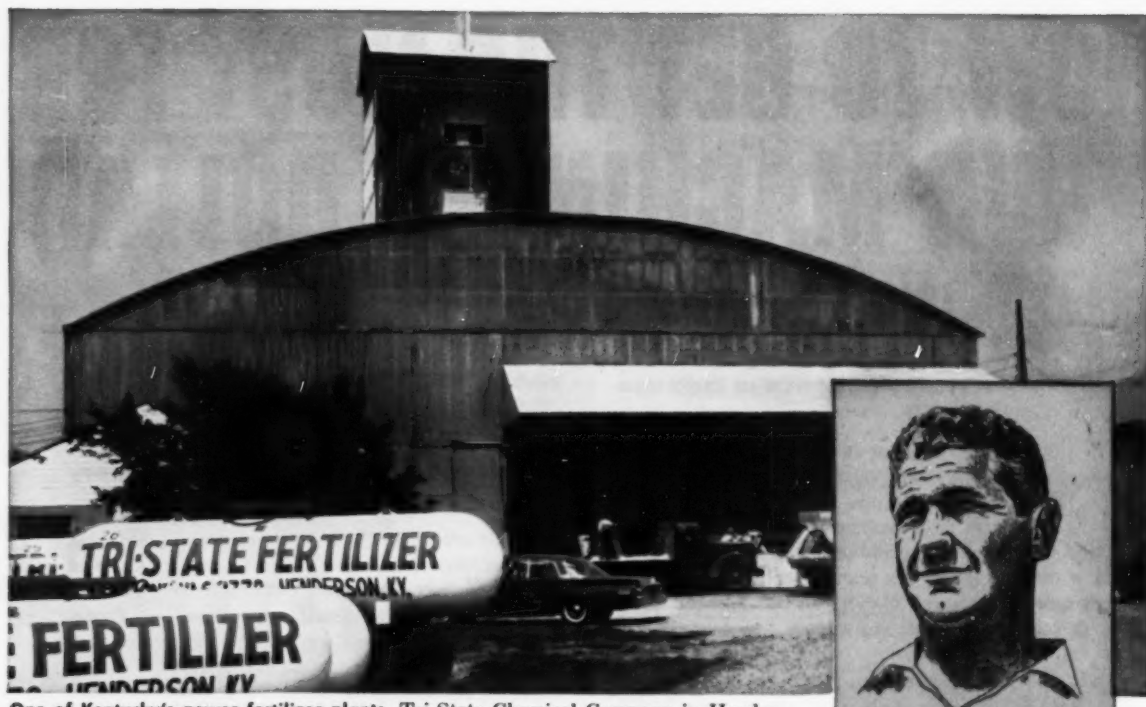
*For rugged, reliable, efficient machinery you can depend upon for years — or for engineering assistance in planning or upgrading your unit — it will pay you to consult Sturtevant. Write to STURTEVANT MILL COMPANY, Boston 22, Mass.*

 <p>MICRONIZER</p>	 <p>PULVER-MILL</p>	 <p>ROTARY PULVERIZER</p>	 <p>MIXER-AMMONIATOR</p>
 <p>GRANULATOR</p>		<p>COMPLETE INSECTICIDE PLANTS COMPLETE GRANULATION PLANTS MIXING AND SHIPPING UNITS DREDGES AND EXCAVATORS CONVEYORS, ELEVATORS, SCREENS FEEDERS AND OTHER ACCESSORIES AIR SEPARATORS CRUSHERS AND GRINDERS</p>	

## STURTEVANT MILL CO.

### Dry Processing Equipment

The "OPEN-DOOR" to lower operating costs over more years



One of Kentucky's newer fertilizer plants, Tri-State Chemical Company in Henderson has enjoyed impressive yearly sales increases since they started business in 1954. With the installation of new granulating machinery, their volume should reach 11,000 tons this year.

V. D. Scott (above) serves progressive Tri-State Chemical Company as Vice President and Treasurer.

## Tri-State Chemical Company Holds Down Costly Corrosion With SPENSOL GREEN:

Anytime corrosion causes your equipment to break down, your profits suffer. Especially, when you have ever-increasing production schedules to meet as does Kentucky's Tri-State Chemical Company. That's one reason why this expanding fertilizer manufacturer uses SPENSOL GREEN, the non-corrosive ammoniating solutions.

Corrosion control pays off big in terms of reduced maintenance and repair bills. Without it, corrosive solutions cost you money daily. You can't see the damage being done. It goes on undetected inside

your storage tanks, pipe lines and boot tanks—then suddenly, something gives out.

That's when corrosion costs come to light. Down time, repair and parts can be expensive.

Why risk it? SPENSOL GREEN offers you greatly improved corrosion control at no extra cost. Compared with competitive brands of ammoniating solutions, SPENSOL GREEN's advanced corrosion inhibitor proved to be at least 54% more effective. Check these laboratory results yourself:

Sample Number	Corrosion (In. Per Year)	Variation From SPENSOL GREEN
Brand A	.021	91%
Brand B	.024	118%
Brand C	.300	2,630%
Brand D	.022	100%
Brand E	.234	2,030%
Brand F	.017	54.5%
Old SPENSOL	.017	54.5%
SPENSOL GREEN	.011	....

Double the life of your equipment and cut corrosion costs by at least half by making your next order SPENSOL GREEN! Contact your Spencer representative now.

Insist on

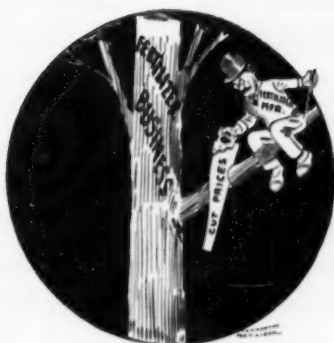
# SPENSOL GREEN

NON-CORROSIVE AMMONIATING SOLUTIONS



Spencer Chemical Company  
Dwight Bldg., Kansas City, Missouri

Sales Offices: Atlanta, Ga., Chicago, Ill., Memphis, Tenn., Omaha, Nebr., Kansas City, Mo.  
Works: Pittsburg, Kans., Henderson, Ky., Vicksburg, Miss.



Bumping About His own Downfall

On the same page with this cartoon, in November 1912, we ran an item headed dramatically "Down with the price cutter." This proves that the vaunted 'power of the press' is not always potent. For the cartoon could well be studied today by too many people in the various phases of our industry, who too often get out on a limb and busily try to saw it off.

As we said then, and could well repeat now: "Columns might well be written to show the disastrous folly of price-cutting, but we know of no more powerful sermon than our cartoon."

## He Introduced America to Superphosphates

With understandable patriotism our 1912 editor claimed a great deal for the ingenuity of James J. Mapes, L.L.D. He did not, strictly speaking, "invent" commercial fertilizer, but he did invent and introduce chemical fertilizer material to our nation at about the same time that the idea of fertilizer itself was demonstrated and proven. Anyhow, here is what we said in 1912:

### THE CHEMIST WHO "INVENTED" COMMERCIAL FERTILIZER

James Jay Mapes, whom Horace Greely considered one of the leading benefactors of American agriculture, and who was also an inventor, was born in New York City, May 29, 1806.

His father was Major General Jonas Mapes, who commanded the military forces of New York City during the second war with England.



JAMES J. MAPES, L.L.D.

James Jay Mapes was trained for a business career and was for some time a sugar refiner. His various enterprises were not financially successful, but Mapes was himself a help to many others.

As agricultural chemist his researches and discoveries were of great value to others and helped the advance of science.

In 1849 Mapes used and introduced superphosphates. He was the inventor of, and the first man to make use of, artificial fertilizers in America.

Although the government at first refused to grant his application for a patent on his invention, it was finally granted in 1859 on the Mapes nitrogenized superphosphate.

He was for many years president of the American institute and occupied the chair of chemistry and natural philosophy in several institutions. He was the editor of several encyclopedic works of a scientific nature.



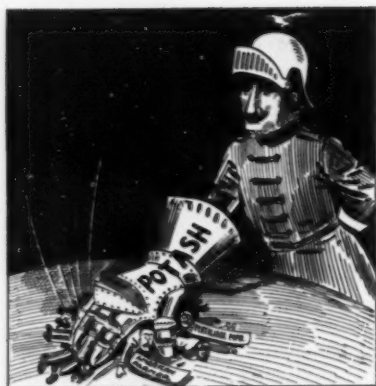
**Fertilizers and  
Fertilizer Raw Materials**

**INTERNATIONAL ORE  
& FERTILIZER CORPORATION**

#### OFFICES OR AFFILIATES IN

Melbourne, Australia  
Vienna, Austria  
Rio de Janeiro, Brazil  
Calgary, Canada  
London, England  
Paris, France  
Dusseldorf, Germany  
Bombay, India  
Calcutta, India  
New Delhi, India  
Secunderabad, India  
Teheran, Iran  
Florence, Italy  
Tokyo, Japan  
Seoul, Korea  
Luxembourg, Luxembourg  
Mexico City, Mexico  
Manila, P.I.  
Lisbon, Portugal  
Durban, South Africa  
Madrid, Spain  
Lausanne, Switzerland  
Tampa, Florida, U.S.A.

500 FIFTH AVENUE, NEW YORK 36, N. Y. • DIVISIONS: Phosphate Rock Export Corporation, Seed & Feed Corporation



The "Mailed Hand" to Date.

This 1912 cartoon was just one of many potent digs our editors took at the German syndicate that was holding a firm hand on the source of potash on which our industry was then completely dependent.

The Great German Potash War was blossoming in full force when we first began publishing this magazine. While negotiations went on, chemists and other scientific people in the U. S. were searching earnestly, as you can well imagine, for other sources. They looked at kelp on the Pacific Coast; the chief chemist of USDA was making every effort to extract potash in usable form from common granite; our western salt lakes and dry lake beds were being methodically checked out. All this was fortunate because World War I soon broke out and completely cut off the supply of potash—so the price and the injustices were academic—but meanwhile we had found potash potentials right here at home.

The interest and concern shown in our early issues toward domestic potash sources prompted us to ask American Potash Institute for this special article.

# The Potash Industry in North America

written by the staff of  
AMERICAN POTASH INSTITUTE

A potash industry based on the extraction of potassium from wood ashes was among the first industries developed by the early settlers of North America. This potash was an important article of commerce in the United States and Canada in colonial times. With the decreased rate of wood clearing and the discovery of potash salt deposits in Germany, the wood ash industry practically disappeared.

The present world potash industry is comparatively young, about 100 years old. This industry is based mainly on the recovery of muriate of potash from underground salt deposits, with a smaller additional production from potash-bearing saline brines.

The first deposits to be developed were in Germany near Stassfurt. Later other deposits were found in France, Spain, Russia, United States,

and Canada. Deposits are known to exist also in other countries but because of unfavorable factors of depth, purity or extent, they are not being worked at present.

Brines also are being utilized as a source of potash in the United States and Israel.

Prior to World War I all of our potash was imported from Germany. When the war cut off our only source, a wild scramble to find and develop American sources of potash resulted. Under the impetus of a ten-fold price increase, 128 potash plants sprang up during the war, mostly at saline lakes in the West but including also kelp operations,

cement and blast furnace dust recovery, distillery waste, greensand marl, and plant ashes.

The production from these operations was able to meet our most pressing needs and reached a total production of 55,000 tons  $K_2O$  a year by the end of the war. With the resumption of potash imports after the war and the return of potash prices to normal levels only one of the 128 "war babies" was able to survive, the company now known as the American Potash and Chemical Corporation.

This operation utilizes a complex brine from partially dried up Searles Lake in California to produce muriate of potash, borax, salt cake, soda ash, and other compounds in a carefully integrated process.

An operation utilizing the brines of the Salduro Marsh to produce muriate of potash was among the



plants active during War I. It closed after the war but following a lapse of 20 years production was resumed in 1938 by Bonneville, Ltd. at a plant located near Wendover, Utah.

Indications of potash occurrence were found in water and oil well drillings in western Texas as far back as 1911. Systematic exploration for potash deposits was authorized by Congress in 1926 in an area known to geologists as Permian Basin of Texas, New Mexico and Utah. This work and independent activities by a private oil company located substantial potash deposits near Carlsbad, New Mexico. This oil company actually first identified its potash in 1925 and set up a company which began potash production in 1931. This company later was absorbed by the United States Borax and Chemical Corporation.

In 1934 the Potash Company of America began production. Several other companies making tests in this area were consolidated into the Union Potash Company, later absorbed by the International Minerals and Chemical Corporation, which began potash production in 1940.

Later, Duval Sulphur and Potash Company began production in 1951, Southwest Potash Company in 1952, and National Potash Company in 1957. These six companies in the Carlsbad area account for about 90% of the potash production in the United States according to Ruhlman of the U. S. Bureau of Mines. Preliminary work to sinking a shaft in the Carlsbad area has been undertaken by a group consisting of the National Farmers Union, Kerr-McGee Oil Industries, and Phillips Chemical Company but there is no indication when the shaft will be sunk.

The Delhi-Taylor oil interests have conducted work preliminary to sinking a shaft to a bed of potash about 3000 feet deep near Moab, Utah. Recently it was announced that the Texas Gulf Sulphur Company would take over the actual operating of this enterprise.

The principal potash ore found in all of these operations is sylvinite, a mixture of potassium chloride and sodium chloride, with impurities such as clay and iron. Smaller amounts of other potash-bearing minerals have been located in this area but these are not worked to any extent except for langbeinite, a double sulfate of potash and magnesia. Large deposits of polyhalite are known to exist east of Carlsbad and in western Texas. This mineral

consists of sulfates of potash, magnesia and lime. Because of lower potash content and difficulty of refining, this mineral is not being utilized at present.

The ore in the Carlsbad area is usually around 1000 feet deep and occurs in veins thick enough to permit the use of machinery such as continuous miners, self propelled trucks, and other labor-saving equipment. The sylvinite is taken to the surface by elevators or skips. This may be ground and used directly as a fertilizer under the name of run-of-mine salts or manure salts. The potash content of this raw material is 22 - 25%  $K_2O$ . While run-of-mine salts are cheap at the mine head, freight charges on the comparatively low grade material make it expensive per pound of potash delivered in the Midwest, South and East where most of the potash is used. Its low potash content also does not make the material a practical source of potash in the preparation of high analysis mixed fertilizers that are now used in most sections of the country.

Most of the ore is processed in refineries to remove the impurities. Very efficient refining methods have been developed whereby a muriate of potash of 95-98% pure potassium chloride with an equivalent content of 60-62%  $K_2O$  is produced. Where an even higher grade potassium chloride is needed such as in the chemical industry, further refining and purification produce a material running over 99.5 per cent KCl.

In the cases of the brine operations the potash occurs in the form of potassium chloride and this is crystallized out of solution by appropriate refining processes.

Muriate of potash accounts for

about 94% of the potash delivered in North America. Most of the remaining 6% is sulfate of potash. This may be prepared several ways. Where langbeinite is used as the source, the potash already is in a sulfate form and the accompanying magnesium sulfate is treated with potassium chloride to convert this also into potassium sulfate. Sulfate of potash also is prepared by treating muriate of potash with sulfuric acid or with a neutral sulfate salt such as sodium sulfate. The sulfate of potash-magnesia or langbeinite mineral can also be used directly as a fertilizer, supplying both potassium and magnesium in the sulfate form.

Discovery of a large potash deposit in Saskatchewan, Canada appears to be of great significance. The extent, massiveness, and high potash content indicate that this is one of the largest potash deposits in the world. It makes certain that North America will have an ample supply of potash for many hundreds of years even if there should be no imports. The deposits are mostly sylvinite and deep, around 3000 feet. Troublesome geological formations above the deposit pose mining problems but when these are solved this Canadian ore body should be one of the most important sources of potash in the world.

In spite of the large production of potash in North America and even sizable exports, there is still an importation of nearly 10% of potash delivered in North America. This is due to ocean freight rates being much lower than the overland freight rates needed to move potash from where it is produced to where it is consumed. The imported potash is confined largely to

U. S. and Canadian Potash Consumption, 1958



eastern Canada and along the eastern seaboard of the United States. It comes mostly from West Germany, France, and Spain.

Over the last twenty-five years potash deliveries in North America have increased sixfold or from about 450,000 tons to 2,780,000 tons  $K_2O$ . This is shown on the accompanying chart which breaks down deliveries into imported, exported, domestic agricultural, and non-agricultural use, while non-agricultural users take about 5% of potash delivered. Exports have been increasing somewhat in recent years and now amount to more than imports. It should be mentioned that sales to Canada, Cuba, and Puerto

Rico are not considered as exports in the potash industry although in government statistics of course shipments to Canada and Cuba would be called exports.

For many years the eastern and southern states took most of the potash, but since World War II the picture has changed due to great increases in potash usage in the Midwest. This section of the country now uses more than any other section. The leading state in potash consumption is Indiana followed by Illinois, North Carolina, Ohio, Florida, and Georgia all using more than a 100,000 tons  $K_2O$  a year, according to U. S. Department of Agriculture figures for the calendar year

1958, the latest available at this time. The states west of the Mississippi River also are increasing potash use at a fast rate and the three west coast states also are moving up the scale. In Canada most of the potash is used in the eastern provinces with Ontario alone using over half of the total of Canadian consumption. The accompanying scatter map shows the distribution of consumption in the United States and Canada.

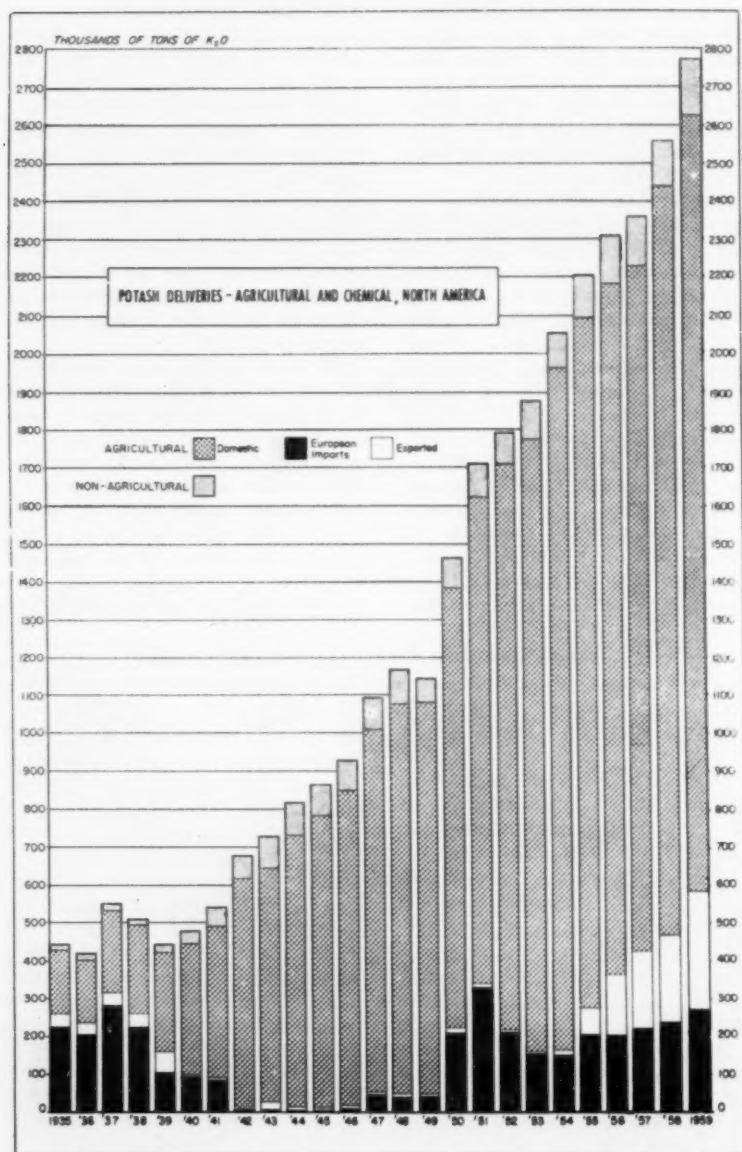
Figures on potash deliveries and potash consumption in the United States will vary considerably since deliveries are determined by location of fertilizer plants and there is of course considerable shipping of fertilizers across state lines.

In agriculture, muriate of potash is by far the most popular form since it is the cheapest and most concentrated potash fertilizer material. Sulfate of potash is used mostly on tobacco, citrus, potatoes, and specialty crops, or on soils in the West where, due to a high salt content, it is not desirable to add even the small quantities of chlorine that would be carried in normal applications of muriate of potash.

Under most conditions either phosphate or phosphate and nitrogen are needed along with the potash in the fertilization of crops. For this reason most of the potash is applied as an ingredient of mixed fertilizer, about 87% of potash consumption in the United States being used in this way and about 13% in the form of straight potash materials.

An important development in the potash industry in recent years is the great growth in demand for a coarse or granular form of muriate of potash. Most refining methods used normally produce a rather fine crystalline product which was very satisfactory for mixing with other fine materials used in making the mixed fertilizer commonly used in the past. It was found that a coarse or granular grade of muriate of potash was an efficient material on which to prepare the granular mixed fertilizer which many farmers prefer. Almost overnight a great demand for the coarser grades of muriate developed and potash producers had to expand their facilities for the production of these grades. Adding to the demand was some increase in use of muriate for direct application, for which the coarse or granular form is preferred. Now about half the muriate of potash is delivered in the coarse or granular grades.

**Potash Deliveries in North America, 1939-1959**



call for

**DUVAL**

when you want

**SERVICE and QUALITY**

We welcome urgent orders—ship them the same day, when they are received by early afternoon. Constant research, development, and control assure you of the highest quality in potash and sulphur.



- **MURIATE OF POTASH**  
standard and granular types
- **SULPHUR**  
lump and molten

**DUVAL SULPHUR  
&  
POTASH COMPANY**

Exclusive Sales Agent

**ASHCRAFT-WILKINSON CO.**

**ATLANTA, GEORGIA**

Norfolk, Va. • Charleston, S. C. • Tampa, Fla. • Jackson, Miss. • Columbus, Ohio • Montgomery, Ala. • Des Moines, Iowa

# ASSOCIATION ACTIVITIES

## Round Table Plans Completed

The executive committee of the Fertilizer Industry Round table have completed plans for the meeting to be held at the Mayflower Hotel, Washington, November 2-4 — and they suggest, as November is a month of conventions in DC that reservations be made early—direct to the hotel.

The program will be devoted to phosphates and their application in our industry, plus a continuation of the panel on preneutralization. Emphasis will be placed on the need for standardization of fertilizer materials, how to reduce in-plant shrinkage and control methods by instrumentation. Subjects will be handled by outstanding speakers.

## 300 Attend ASA St. Paul Meeting

The summer meeting of the North Central Branch of the American Society of Agronomy, which met July 10-13 on the Minnesota campus, attracted some 300 crops and soils experts. The program featured reports and tours of research projects and facilities on the campus and at three experiment stations. The USDA station at LaCrosse also was visited.

## Georgia Society Holds 4 Summer Meetings

As they have done for a number of years, the Georgia Plant Food Educational Society has completed a series of four Summer meetings. Two were held in Henry and Murray counties, where clinics on soils, soil fertility, pastures were held. Two were in Dougherty and Toombs counties and here the emphasis was on corn, coastal bermuda and bahia-grass.

## Canadian Convention August 21-25

This is a final reminder of the annual convention of the Canadian Fertilizer Association, headed by Alex Mooney, president and H. H. Skelton, convention chairman. The meeting will be held as usual at the fabulous Manoir Richelieu, Murray Bay, Quebec. This is the 15th annual convention of this active association.

Some 200 delegates from across Canada and some from the United States will attend.

Among the papers to be presented will be one on forest fertilization by Dr. Paul L. Aird of the Canadian International Paper Company, Grenville, Que., reporting on the experiments in tree fertilization being conducted at his company's Harrington forest farm and other locations.

Dr. W. A. Garman of NPFI will report on the eighth international grassland congress being held in England this month. L. R. Daigault of Cockfield Brown and Company, Montreal, will speak on "preparing the soil for sales" and L. A. Lyone Heppner of the Confederation Life Association, Montreal, will address the conference on "you don't sell things, you sell people." John Fisher of the Canadian Tourist Association, Toronto, has been invited to address the banquet meeting.

Committee chairmen making convention arrangements include Al Lambert and Lorimer Whitworth of Quebec City; Harold Sewell, Paul Bastien, Arthur O'Donoghue, Delbert and Vera Dupre of Montreal; and Alex Mooney (president of the association), Roy Pennington and Richard Allman of Toronto.

H. H. Skelton of Montreal is general convention chairman.

## Pacific NW Regional Fertilizer Conference

Meeting July 13-15 at Salt Lake City, the 11th annual Pacific Northwest Fertilizer Conference attended a program listing 26 speakers. The conference is jointly sponsored by the Pacific Northwest Plant Food Association, together with the State Colleges of Idaho, Oregon and Washington.

A key talk was given by C. E. Kellogg of the USDA Agricultural Research Service which cautioned that farmers must know how to handle the interaction of the various ways now existing by which soils may be changed. The conference included panel discussions, illustrated papers and presentations by agronomists and fertilizer people. Conference president Karl Baur, Portland, Oregon, directed the meetings; Dean S. Farnsworth, Phillips Petroleum, headed general arrangements.

A tour of the Utah AES farm at Logan was under the direction of US Steel's Roy Lipps. During the tour, Dean D. G. Aldrich, U of Cal., spoke on zoning of land for agriculture. At the evening banquet, Dr. Royal L. Garff, U. of Utah, made the address.

## Mississippi Fertility Council Holding First Convention

An outstanding program is planned for the first annual convention of the Mississippi Soil Fertility and Plant Food Council, scheduled for August 25-27 at the Buena Vista Hotel, Biloxi, according to Council President H. S. "Bill" Gordon, Jr.

The afternoon program for Thursday, August 25, will be presided over by Vice-President Mike R. Blouin, and will feature addresses by staff representatives from Mississippi State University. Thursday night's entertainment will be highlighted by the gulf coast favorite, a 'shrimp jamboree'.

President Bill Gordon will preside over the Friday morning session as business and industry leaders appear on the program.

A golf and horseshoe tournament is slated for Friday afternoon. A social hour, banquet, and dance will end the day's activities.

Saturday morning will be devoted to a business session. Officers will be elected and goals, resolutions, objectives, etc. will be discussed.

This 'family-type' convention is expected to be well attended by dealers, fertilizer manufacturers, salesmen, agronomists, and educational people interested.

## Industry Meeting Calendar

DATE	EVENT	LOCATION	CITY
Aug. 10-11	Northeast Safety School	Park-Sheraton Hotel	New York, N. Y.
Aug. 16-17	Midwest Safety School	Safety Council Hdq.	Chicago, Ill.
Aug. 21-25	Canadian Fertilizer Association	Manoir Richelieu Hotel	Murray Bay, Que.
Aug. 25-27	Southeast Safety School	Cape Fear Hotel	Wilmington, N. C.
Sept. 29-30	Northeast Fertilizer Conference	Hotel Hershey	Hershey, Pa.
Oct. 5-6	Southeast Fertilizer Conference	Biltmore Hotel	Atlanta, Ga.
Oct. 17-18	Fertilizer Industry Safety Section	Morrison Hotel	Chicago, Ill.
Nov. 2-4	Fertilizer Industry 'Round Table'	Mayflower Hotel	Washington, D. C.
Nov. 9-11	National Fertilizer Solutions Assn.	Peabody Hotel	Memphis, Tenn.
Nov. 13-15	California Fertilizer Association	del Coronado Hotel	Coronado, Calif.
1961			
Jan. 11-13	Agricultural Ammonia Institute	Peabody Hotel	Memphis, Tenn.



**Multiwall Bags by International Paper**



*Multiwall bag undergoes drop test at new Camden lab.*

## Trial by torture

Read about International Paper's new Camden lab  
— a modern proving ground for multiwall bags.

**M**ULTIWALL BAGS must withstand punishment. It is their job. But, as industry expands its use of multiwalls, each new product presents totally new problems for these versatile bags.

This is why International Paper built the most modern research and development center at their Camden, Arkansas Bagpak® plant.

Here, new bag papers, adhesives and closing materials are subjected to vir-

tually every gruelling condition they might meet en route from plant to consumer. The bag in our photograph is undergoing a drop test, one of many tortures new bags encounter.

Our laboratory also includes an "Arctic-Jungle Room" where temperature and humidity may be varied *drastically*. A vibration table to simulate the effects of truck and rail motion. And the latest equipment to determine exactly the

right bag for any product—new or old.

These are just a few of the tests our bags meet. Each one is designed to help us make better multiwall bags. Bags that withstand long-distance hauling, extreme weather, rough handling and high-speed filling.

Whatever your multiwall packaging needs, you will find it profitable to talk to your Bagpak packaging engineer. He has complete information.



**INTERNATIONAL PAPER**  
BAGPAK DIVISION • NEW YORK 17, N. Y.

# ***Sinclair*** **ANHYDROUS AMMONIA**

**ALL YOU NEED—  
ON TIME**



With vast, centrally-located storage facilities for anhydrous ammonia, Sinclair stands ready to supply your requirements from Hammond, Indiana—*on time* deliveries even during the peak season, at a word from you.

**SINCLAIR PETROCHEMICALS, INC.**

Subsidiary of Sinclair Oil Corporation

600 Fifth Avenue, New York 20, N. Y. • 155 North Wacker Drive, Chicago 6, Ill.



the ROLE of

# FERTILIZER in the Retail Fertilizer Dealer's Business

This is the initial article in a series especially written for the fertilizer industry audience of **COMMERCIAL FERTILIZER** magazine. Nearly a year in the making, they will cover various phases of the Iowa fertilizer dealer-farmer survey, the deepest study yet made of this frequently troublesome area of fertilizer distribution. Some of the highlights of these findings were presented by Professors Bohlen and Beal to an exceptionally attentive audience at the recent NPFI convention.

by  
Rural Sociologists  
Iowa State University

The fertilizer retail dealer is the final link in the fertilizer sales chain for most fertilizer sales. The manufacturer or distributor is dependent upon this dealer for a great deal of his success. It is, therefore, of considerable importance to the manufacturer or distributor that he intimately understand the role of fertilizer in the over-all businesses of his retailers.

The findings reported in this article provide some indication of the various roles that fertilizer plays in these dealers' businesses—for example, that it is seen as a relatively unimportant part of many of these dealers' businesses, but that for some dealers it plays an important role. And, in these businesses where it is assigned an important role, a relatively good job of fertilizer merchandising is being done.

This article is based primarily upon the findings of a study of a random sample of 118 Iowa retail fertilizer dealers, representing some 7 percent of the state's fertilizer

dealers, conducted during the spring of 1958. It was conducted by Iowa State University sociologists through an Agricultural Experiment Station project in cooperation with the Tennessee Valley Authority.

It is often possible in describing groups of persons or businesses to say "on the average this group is . . ." However, the Iowa fertilizer dealers appeared to vary considerably in that different fertilizer dealers appeared to be motivated by extremely different types of forces, and fertilizer was assigned to considerably different roles in the businesses of the dealers handling it. And, in the Iowa study it was found that fertilizer was sold by almost every conceivable type of farm related business. Descriptive economic data provide some indication

Data in this paper are from Iowa State University Experiment Station Project No. 1352 done in cooperation with the Agricultural Economics Branch, Division of Agricultural Relations, Tennessee Valley Authority. The project is under the co-leadership of George M. Beal and Joe M. Bohlen, professors of rural sociology, Department of Economics and Sociology, Iowa State University. Data are taken from three phases of Project No. 1352. These phases were under the leadership and supervision of assistant professor John Harp, and graduate assistants Larry Campbell and Quentin Jenkins. They were assisted by graduate assistant research team members Larry Kasperbauer, Daryl Hobbs, Richard Warren, Ron Powers and Spencer Hildahl.

of the widely different economic roles fertilizer played in the Iowa fertilizer dealers' businesses.

Although the average total gross business volume of the 118 dealers was about \$460,700, it ranged from \$12,000 to \$2,400,000.

Total Business Volumes of Dealers Selling Fertilizer	
Gross Income	Percent of Dealers
Less than \$100,000	27%
\$100,000 - \$299,999	28%
\$300,000 - \$599,999	19%
\$600,000 - \$999,999	14%
\$1,000,000 and more	12%

The average dealer's fertilizer sales volume in the 1956-57 business year was about \$45,600; the range was from \$500 to \$330,000.

Dealers' Fertilizer Sales Volumes	
Fertilizer Sales	Percent of Dealers
\$0 - \$10,999	25%
\$11,000 - \$29,999	35%
\$30,000 - \$49,999	14%
\$50,000 - \$69,999	9%
\$70,000 - \$89,999	7%
\$90,000 - \$110,000	4%
Over \$110,000	5%

And, although fertilizer comprised, on the average, 14.8 percent of the dealers' total business volumes, the range was from 1 to 75 percent.

Percent Fertilizer was of Dealers' Total Business Volumes	
Percent of Gross	Percent of Dealers
Less than 5%	22%
5 - 9%	21%
10 - 14%	23%
15 - 24%	14%
25 - 49%	15%
50% and more	5%

There was also a wide range in the dealers' average fertilizer markup. Although the average fertilizer markup was 9.3 percent, the markup ranged from as low as 1 percent to as high as 35 percent. About a fourth of the dealers said they were obtaining a fertilizer markup of over 10 percent. To provide a basis for

**Relationship Between Fertilizer Gross Profit and Major Reasons  
Given for Not "Pushing" Fertilizer Harder**

Reasons	Average Fert. Gross Profit	Percent of Dealers
Too much competition	\$ 242	1
Lack of facilities	\$ 1,364	12
Trouble involved in extending credit	\$ 1,900	11
Low profit margins	\$ 2,100	27
Lack of time	\$ 4,447	17
We push fertilizer as hard as we can	\$11,683	10

comparison, information was also gathered about markups the dealers were maintaining in other departments of their businesses. The average markup on other commodities handled by these dealers was 14.9 percent as compared with the 9.3 percent for fertilizer. Some examples of specific averages are: feed, 13 percent; seed, 12 percent; building supplies, 21 percent; and implements, 24 percent. It is obvious that there may be different overhead costs for the various lines and thus the perceived needs for additional markup.

**Dealers' Fertilizer Markups**

Fertilizer Gross Profit Margin	Percent of Dealers
Less than 6%	20%
6 - 9%	21%
10%	26%
11 - 12%	12%
13 - 15%	8%
16% and more	6%

The dealers' average fertilizer gross profit was approximately \$4,000. However, the range was again extreme, with about 20 percent of the dealers having fertilizer gross profits of under \$500, and about 10 percent of them having fertilizer gross profits of over \$10,000. The range was from \$110 to \$39,600.

**Dealers' Fertilizer Gross Profits**

Fertilizer Gross Profit	Percent of Dealers
Less than \$500	21%
\$500 - \$999	10%
\$1,000 - \$1,999	16%
\$2,000 - \$4,999	21%
\$5,000 - \$9,999	12%
\$10,000 and over	9%

When the dealers were categorized on the basis of their major

source of income, 36 percent were found to be grain dealers. This was the largest group. The second largest group, 19 percent, were those whose major income source was feed sales. Fertilizer was the major source of gross income for 8.5 percent of the dealers. The diversity of types of businesses selling fertilizer may be noted in the table which shows the percentages of dealers who had each of the major product lines indicated.

**Major Income Source  
of Dealers Selling Fertilizer**

Major Income Source	Percent of Dealers
Grain	36%
Feed	20%
Farming	9%
Petroleum	9%
Fertilizer	9%
Seed	5%
Trucking	3%
Eggs	2%
Agricultural Chemicals	1%
Lumber	1%
Building Materials	1%
Christmas Trees	1%
Farm Implements	1%
Livestock Sales	1%
No answer	2%

Considering the previously presented economic characteristics of the role of fertilizer in the dealers' businesses, it would not seem unreasonable if every fertilizer dealer does not aggressively work at increasing his fertilizer sales. For this reason, the dealers were asked what factors they thought limited their fertilizer sales. This attitudinal information also provides further insights into the role assigned fertilizer in these dealers' businesses.

Asked what factors **within their**

businesses most limited their fertilizer sales, the dealers responded in this manner:

1. 36 percent said it was lack of time, effort, or adequate services.
2. 27 percent said the competition was too great.
3. 8 percent mentioned lack of profit.
4. 25 percent named farmer limitations such as lack of capital or knowledge, or said that weather uncertainty kept farmers from using fertilizer.

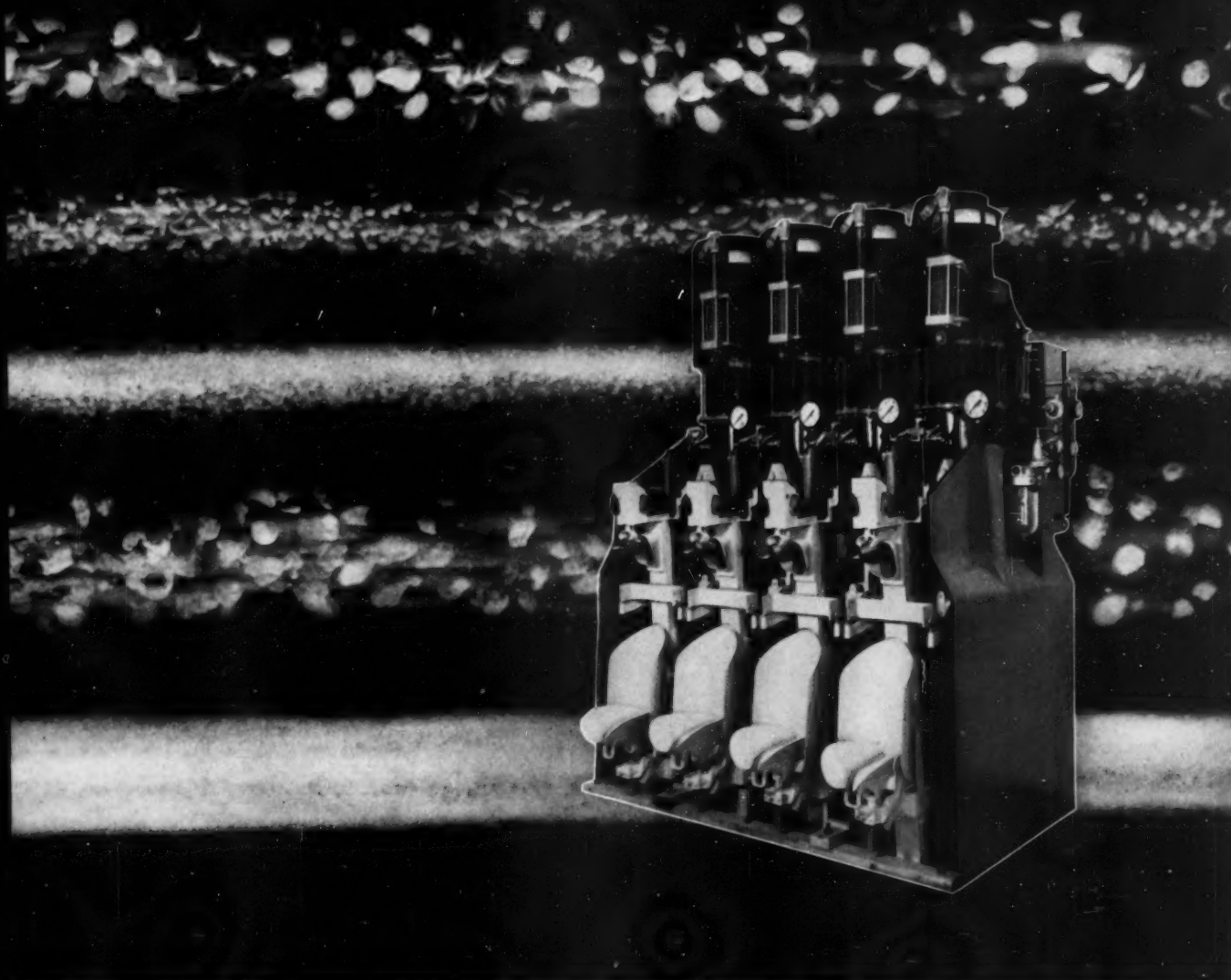
Several important elements come to the surface when these responses are analyzed. First, from dealers' statements that lack of time, effort, or adequate services limited their fertilizer sales, it might be inferred that the profit involved was not adequate for the dealers to invest time, energy, or capital in their fertilizer department as compared with the returns on equal investments of time and money in other departments of their businesses. From the statement that the competition was too great, it could be inferred that dealers felt there was not enough profit to make it worthwhile for them to compete for farmers' fertilizer dollars.

Lending further substantiation to the problem of the relatively low profit on fertilizer were the dealers' answers to a question in which they were asked if they thought the fertilizer profit margin was adequate. Only 29 percent of the dealers said they thought the fertilizer profit margin was adequate; 71 percent said they thought it was inadequate. As a check on this item, these answers were compared with the dealers' actual fertilizer markups. The relationship was found to be very high, indicating that the dealers' answers to this question were consistent with their actual fertilizer markups.

Mention of factors such as farmers' lack of capital, knowledge and weather seems to indicate that the

Role	Percent Naming	Average Fert. Gross Profit Margin	Average Fert. Gross Profit	Average Fert. Sales	Average Percent Fert. is of Total Bus. Vol.	Average Gross Business Volume	Ranking of No. of Fert. Merchandising Techniques Used	Rank of Favorable Toward New Merchandising Techniques
A good money-maker in itself	26	12.1%	\$4,954	\$73,385	26%	\$358,460	2	1
An important service to bring in customers	31	9.5%	\$4,945	\$53,555	16%	\$521,600	1	2
Just another service to customers	26	8.1%	\$2,466	\$24,720	11%	\$498,462	4	4
Not a money-maker, but have to carry fertilizer to compete	15	6.4%	\$2,922	\$25,300	13%	\$305,620	3	3
Average for all dealers		9.3%	\$4,004	\$45,600	17%	\$460,700		





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*cial and specialty grades • Excellent weight accuracy • Reduced dusting and spillage • Easier to operate • Lower maintenance costs.*

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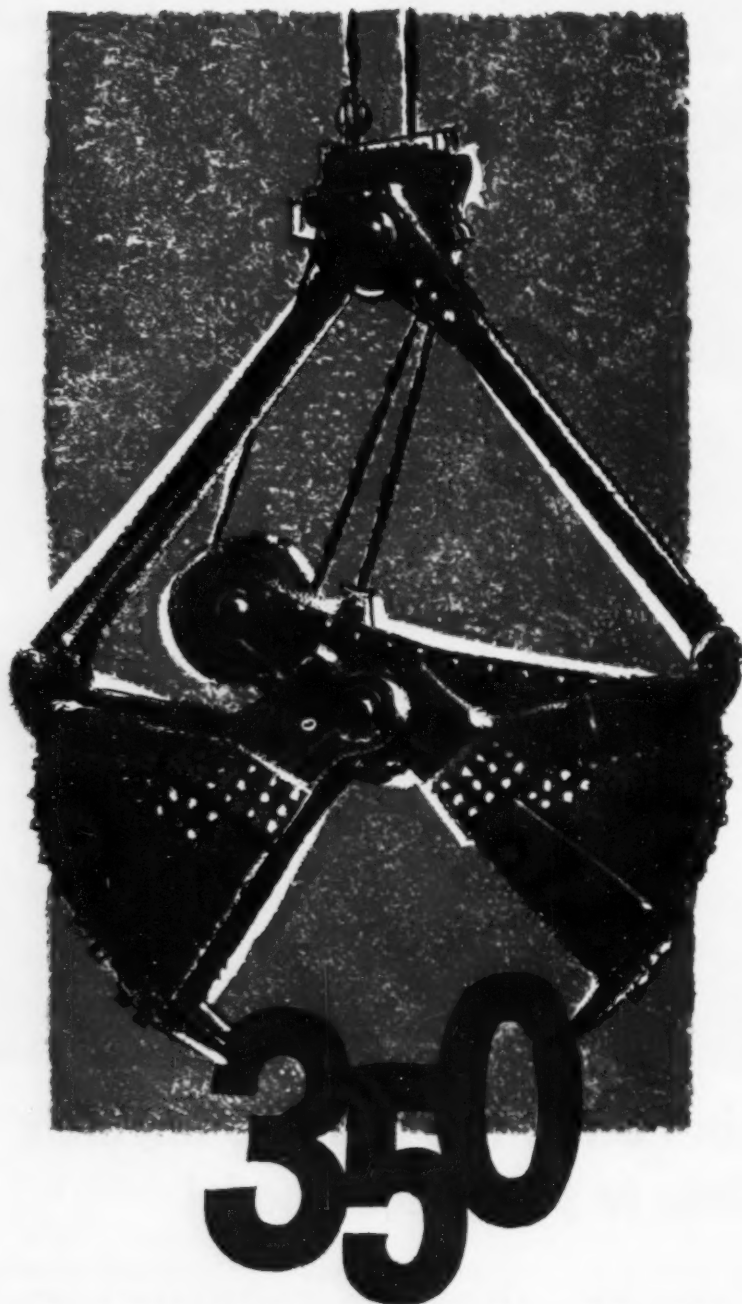
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Clamshell Buckets

farmers in these dealers' trade areas did not have enough knowledge about fertilizer to realize that it is an extremely sound investment even in years when weather conditions are such that returns on fertilizer investments are lower than average. In turn, this would also indicate that the dealers do not feel their profits are sufficient for them to do an educational job on these farmers.

In relation to the statement that farmers' lack of capital was a limiting factor, a state-wide study of Iowa farmers conducted during 1958 showed that only 5 percent of the farmers considered lack of credit to be a factor limiting their fertilizer use. From this it seems apparent that farmers can obtain credit for present level of fertilizer purchases. Therefore, it might be inferred that the dealers were speaking of farmers' decisions to invest their capital in other parts of their farming operations rather than in fertilizer.

Another attitudinal dimension might be called "willingness to push fertilizer sales." It is, incidentally, perhaps the best single predictor of fertilizer sales success. Data for this dimension were gathered by asking the dealers to complete a sentence beginning "I'd push fertilizer harder but . . ." Various explanations were offered but the most interesting response, given by slightly over 10 percent of the dealers, was: "We are pushing fertilizer as hard as we can." This 10 percent of the dealers had average fertilizer gross profits of \$11,683 as compared with the all-dealer average of \$4,000. Implicit in the responses, shown in the table below, is again the apparent unwillingness of the dealers to push fertilizer sales.

As stated previously, it is difficult to speak of the fertilizer dealer as a "type." However, on examination of the role fertilizer plays in the various dealers' businesses, it seems possible to establish four major "types" of dealers.

To divide the dealers into these meaningful types, they were sorted on the basis of their responses to a question asking them what role fertilizer played in their total businesses. The responses and the percent of dealers giving each of them are recorded in the table below, along with the characteristics of the dealers giving each of the responses.

In general, it appears that two major types of dealers may be classified as being relatively successful as fertilizer retailers. They are: (1)

dealers who consider fertilizer a good money-maker in itself, and (2) dealers who consider fertilizer an **important** service to bring in customers. However, these two groups appear to vary in one major fashion: the size of their total businesses and the percentage fertilizer is of their total business income.

Those dealers who say that fertilizer is a good money-maker in itself appear to be relatively small dealers in terms of total business volume, but who are pushing fertilizer sales very intensively. They rank well above average in fertilizer sales volume. The dealers who say that fertilizer is an important service to bring in customers appear to be operating rather large enterprises in which fertilizer plays an important complementary role, that is, it is used to "round out" the products which the farmer may purchase from the firm. These dealers are also pushing fertilizer rather intensively and maintaining what they believe to be an adequate profit margin on it.

The two groups of dealers who do not consider fertilizer to be an important part of their businesses appear not to be competing seriously for the fertilizer market. The only evidence indicating that they are competing for the fertilizer market is that they are using price competition.

For the fertilizer manufacturer or distributor it would appear that the first two classes or types of dealers would certainly be of the most interest. Both are presently actively promoting fertilizer sales and appear to be relatively receptive to new merchandising techniques.

Of the two latter types of dealers, it appears that extensive educational work would have to be done before these dealers would actively promote the manufacturer's or distributor's product. There is a possibility that these dealers could be made aware of the possibility of competing for the fertilizer market on some other basis than price competition. However, their low scores on the attitude toward the acceptance of new merchandising techniques would suggest that this would be a difficult task, on the average.

Look for  
**The Role of the  
Fertilizer Dealer in  
Fertilizer Sales and Use**  
in our September issue



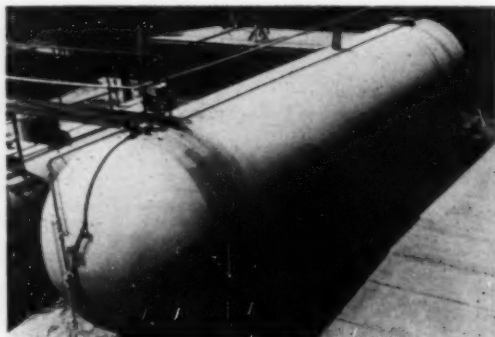
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## Gamma Sigma Delta International Elects

Gamma Sigma Delta, the international honorary society for the promotion of scientific advancement in agriculture recently concluded its business meeting and announced the election of these officers: President, Dr. D. M. Hall, U. of Illinois; vice president, Dr. Earl G. Rodgers, Florida AES; secretary, Russell Dickerson, Penn. State; treasurer, Homer J. L'Hote, U. of Missouri; historian L. E. Kunkle, Ohio State.

## N. C.'s Carpenter Receives Award

William L. Carpenter, head of the Division of Agricultural Information, School of Agriculture, North Carolina State College, Raleigh, July 18 was presented the "Agricultural Communications Award," sponsored by the American Association of Agricultural College Editors and the National Plant Food Institute, at a special luncheon ceremony at Oregon State College.

The annual award was presented to Mr. Carpenter "in recognition of the most notable growth in competence and achievement in agricultural communications during the year 1959," in competition with other members of AAACE at land-grant colleges in the United States.

## NPFI Movie Takes Blue Ribbon

One of the National Plant Food Institute's educational movies, "Cash in on Grass," captured a blue ribbon award in the American Society of Agricultural Engineers film competition.

In notifying the Institute, W. L. Maxwell, chairman of the 1960 subcommittee on movies, said "... we feel that 'Cash in on Grass' is superior and the scoring of the judges entitles the film to a blue ribbon which it justly deserves."

The award was made by the ASAE Committee on Extension at its 53rd annual meeting at Ohio State University.

"Cash in on Grass" is a 'how-to' motion picture designed to show farmers how they can utilize modern methods to increase the productivity of their pastures, range and forage crops.



## 1960 Wiley Award Goes to Jonas Carol

The 1960 Harvey W. Wiley Award of the Association of Official Agricultural Chemists, presented annually to a scientist who has made an outstanding contribution, has this year gone to Jonas Carol of the Food and Drug Administration.

## Grace Division Advertising Honored

The Nitrogen Products Division (formerly Grace Chemical Division; see 'Changes' in this issue) of W. R. Grace and Company was awarded three citations of excellence for its advertising at the 32nd annual conference of the First Advertising Agency Group in Dallas, Texas, last month. Their newsletters received the first award in the field of industrial direct mail. A series of advertisements featuring Grace Feed Urea received a citation of excellence in the field of advertising for farm, livestock and horticultural publications and a sales promotion manual produced by the Nitrogen Products Division received a citation of excellence in its category.

The prize-winning entries were prepared by the Ridgway-Hirsch Advertising Company, St. Louis member of the F. A. A. G., under the supervision of Burton L. How, advertising manager of the Nitrogen Products Division.

## Virginia-Carolina Presents 175 Awards

Virginia-Carolina Chemical Corporation last month presented service awards to 175 employees in ceremonies held at four of the company's Polk County, Florida locations.

W. Barnwell, C. E. Hall, L. E. Haymond, and L. A. Simmons received the gold V-C oval embedded with two diamonds and two rubies for 40 years of service.

Executive vice president Charles T. Harding made the presentations.

## V-C Publications Honored

Two Virginia-Carolina Chemical Corporation publications have received awards for 1959-60.

The V-C annual report won a merit award from Financial World for the 8th consecutive year. R. Clifton Long, secretary and advertising manager at V-C, is responsible for the annual report.

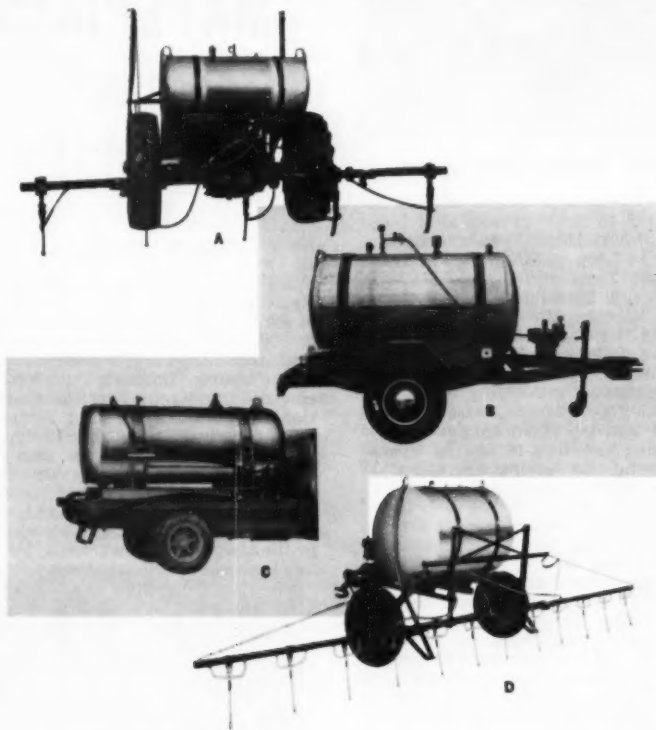
V-C Outlook, monthly newspaper for its fertilizer dealers, won an award of excellence from the International Council of Industrial Editors. E. Hale Jones, edits this.

## "The Best Buy" .....

## In Fertilizer Solutions Equipment

a complete line designed to  
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General Metals Inc., manufactures a wide variety of Field  
Applicators . . . Transport Units . . . Storage Tanks . . .  
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Nozzles . . . Complete Engineering Services . . . Complete Installation Services.



### A. "SPEEDY SPREAD"

#### Tractor Mounted Applicator

For nitrogen solutions, liquid fertilizers, herbicides and insecticides. For applying pressure and non-pressure solutions . . . will withstand the severest field conditions . . . attachments are priced separately . . . you buy only the equipment you need. Shipped assembled for immediate mounting.

### B. "SPEEDY SPREAD"

#### Trailer Mounted Nurse Tank.

Rugged construction . . . backs easily with short turning radius. Single or tandem torsion spring absorbs road shocks and field irregularities. Complete with non-corrosive fittings, air compressor or pump, heavy duty saddles, front end jack and 500 or 1,000 gallon tanks. Available with tank car unloading kit.

### C. GENERAL METALS

#### Deluxe Mounted Transport Tank.

1250, 1000 or 500 gallon tanks of steel, aluminum or stainless steel. Deluxe and standard model with choice of pump or compressor. Non-corrosive parts of durable, heavy duty construction. Shipped complete and ready for use. Easily bolts to your truck.

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#### Trailer Mounted Field Applicator

Constructed with heavy duty arch frame to withstand severest field conditions . . . 235 gallon pressure and 210 gallon non-pressure tanks . . . metering pump with "dial the rate of application" . . . excellent for top dressing pastures, small grain or row crops by using drop-lets as shown.

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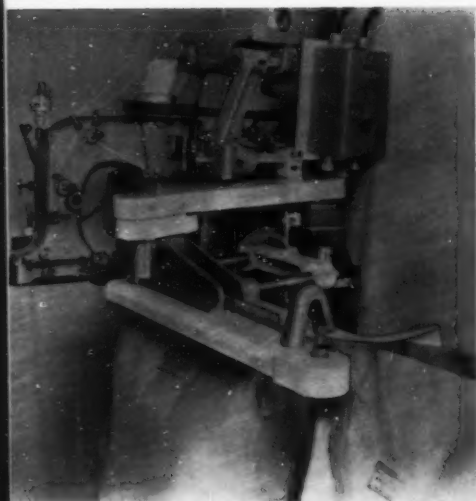
Call, write or wire today for full information.

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**New Sewing Attachment**

Development of a new sewing attachment to simplify and speed closure of multiwall paper shipping bags has been announced by Bemis Bro. Bag Company.

The Sew-Rite Attachment, which is mounted on the sewing pedestal, permits the bag to adjust itself properly before engaging the sewing machine, consumes less operator time by actually carrying the bag to the sewing machine, and reduces thread and needle breakage due to improper handling of bag by operator during the sewing operation.

An operator simply guides the filled bag into the co-acting V-belts of the Sew-Rite Attachment. From that point, the bag is automatically fed into the sewing machine. The operator is free to grasp and lead the next bag into the attachment.

The Sew-Rite Attachment enables the sewing machine to effect a neater and more secure closure than by direct feed methods and allows an inexperienced operator to obtain high efficiency on the packaging line.

The new unit was developed by the Packaging Service unit of the Bemis Bro. Bag Company.

For further information, circle number 1 on CF's Information Service card, page 71.

### Feeders and Rotary Valves

A new bulletin describing and illustrating its complete line of roll and vane-type feeders and rotary valves is now being offered by Fuller Co. The feeders, built of cast iron or iron and steel combinations, are designed to handle a large variety of dry pulverized and granular materials.

The bulletin includes descriptions of the various types of feeders and lists materials handled by them.

Five photographs and twenty drawings of different type feeders appear in the bulletin, and five tables give key dimension and capacity figures.

For your copy, circle number 2 on CF's Information Service card, page 71.

## FREE LITERATURE ON EQUIPMENT MATERIALS AND SUPPLIES

### Small pH Meter

An illustrated data sheet from Sel-Rex Instruments, Inc., shows how precise, reproducible readings within  $\pm 0.02$  pH accuracy are obtained with the 'Electrion,' a palm-sized pH meter using a single combination electrode and requiring standardization only once a week or less.

To obtain its precise readings, according to the data sheet, the electrion uses a drift-free, constant-reading meter with reference pointer; easily-connected solid ground; fast-response tubes needing no breaking-in time; and operates from 115V line to eliminate warm-up time.

The technical data sheet features illustrations showing the pH meter in operation, component parts with their uses, and the golden Electrion with unique handle and electrode holder.

For a free copy, circle number 3 on CF's Information Service card, page 71.

### Air Sampler

A new lightweight high-volume air sampler, developed by the New York office of the Atomic Energy Commission, Health and Safety Laboratory, is now available for sale to industry.

This lightweight, 3½ pound high volume sampler, as Unico Model No. 300, ran 427 continuous hours using a 4-inch diameter Whatman-41 filter paper. The unit did not overheat and the motor was not damaged, and at the end of the continuous run, brushes were replaced and the operation repeated.

The Unico Model No. 300 pump is made of high impact styrene, and the end mounts are machined of aluminum. The filter holder is a one-piece machined ring and the paper is sealed by an O-ring attached to the body of the pump. The flow rate is measured by the means of an indirect variable orifice.

For full information, circle number 4 on CF's Information Service card, page 71.



**Safety-Relief Valve**

A new series of Safety-Relief Valves for chemical processing, and other services is now in production at Farris Engineering Corporation. This new 1870 Series provides precise blowdown ring control for gases and vapors, and safety relief for liquids in a wide range of applications where maximum pressure is 300 psi.

The 1870 Series has a one-piece stainless steel body and stainless steel disc which contains inlet pressure without other joints or gasketing. This one-piece stainless steel construction provides a leak-proof seat that eliminates waste and corrosion problems. The optically ground stainless steel seat and disc of this new Series assures maximum tightness.

For complete information, circle number 5 on CF's Information Service card, page 71.

### Car Shaker

Allis-Chalmers has streamlined its 3½-ton car shaker by fitting its self-contained, completely sealed two-bearing mechanism in the nodular iron housing within the body.

The mechanism, which includes a short center V-belt drive and 10-hp high starting torque motor, is readily accessible by removing one side plate. The motor is isolated by four rubber mountings which are bolted to the body.

Grease fittings located on each end of the mechanism are readily accessible from above. Lift beams are drilled to accommodate single or twin hook hoists and include the lift chains.

The shaker body has extra-long, wide-faced shoes to fit any standard U. S. hopper-bottom gondola car and is balanced to hang level to facilitate centering on car eaves.

The 3½-ton shaker is designed for fast, safe, economical pushbutton unloading of 10 cars or more per day of granular material from hopper bottom gondola cars.

For complete information, circle number 6 on CF's Information Service card, page 71.



### Portable Agitator

A completely new line of 'Lightnin' propeller-type portable mixers for fluid agitation in process industries has been announced by Mixing Equipment Company. Designed as an integral unit, the new mixer offers increased mixing efficiency, improved handling convenience, and maintenance-free operation. It will be marketed in sizes ranging from 1/4 HP to 3 HP, and will also be available in a fixed mounting design in all except 1/4 HP sizes.

The new mixers offer not only direct-drive speeds of 1750 RPM and 1150 RPM with higher impeller heads, but also a gear-drive model speed of 350 RPM providing up to 45% more flow than previous units.

Specially-designed chemical plant motors, standard at no extra cost with both portable and fixed-mounting mixers, are ball bearing . . . totally enclosed or explosion proof.

Standard single or dual super-pitch propellers, in geometrically similar sizes, are offered in a completely new-design series.

For further details, circle number 7 on CF's Information Service card, page 71.

### Project Engineering Service

A new 12-page brochure, Bulletin No. 8010, describes Dorr-Oliver Incorporated, as a source of engineering services in the development of complete plants on a world wide basis.

The services offered include laboratory testing, pilot plant demonstration, flowsheet preparation and engineering studies, cost estimates, plant design & specifications, purchase of equipment, supply of complete plants, erection and construction, supervision of initial operation, and training of plant personnel.

The brochure describes and illustrates specific examples of chemical fertilizer production and nine other specialized fields.

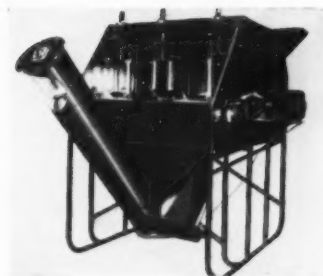
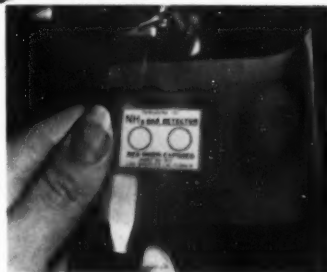
Dorr-Oliver Bulletin No. 8010 is available free by circling number 8 on CF's Information Service card, page 71.

### Leakage Detector

Gas and liquid leakage of as little as 1/100 cc per hour can be detected instantly and simply with Tec-Tape, a flexible, adhesive-backed tape bearing indicators which turn a stated contrasting color on exposure to a specific gas or liquid. Offered by Pyrodyne, Inc., manufacturers of Temp-Plates and Temp-Tape, the new Tec-Tape is presented in wrap-around style for system connections and in surface mounting type for indication of random gas leakage.

Tec-Tape is available for the detection of anhydrous ammonia, acid fumes and many other gases and fluids.

For further information, circle number 9 on CF's Information Service card, page 71.



### 'Package' Fertilizer Mixer

Availability of a new self-contained fertilizer mixing plant which the manufacturers will install in one week has been announced by Continental Sales Company.

The new fertilizer mixing plant, Blend-O-Mixer, is 17' x 5', completely automatic, and delivers one ton of fertilizer every three minutes. The ratio of ingredients is controlled by an electric timer. Hopper cars are automatically unloaded by the tubular conveyor and automatically stored in five 100-ton capacity bins.

The new Blend-O-Mixer plant can be obtained in three ways: buying the Blend-O-Mixer and installing it in an existing building; building a plant and installing the Blend-O-Mixer; Rental of the Blend-O-Mixer at a nominal tonnage charge of \$2.25 per ton.

Complete information about the Blend-O-Mixer in brochure form is available by circling number 10 on CF's Information Service card, page 71.

### Immersion Heating, Cooling

Dean's new Technical Bulletin M-11 illustrates various types of standard and special double-embossed Panelcoil, particularly suited for immersion heating or cooling. The double-embossed units are stronger than the single-embossed design and offer a lower pressure drop because the channels are twice as large.

Sizes and shapes are almost unlimited in variety. Panelcoil can be formed to fit almost any space and can be assembled in special banks to give high capacity per cubic foot.

For a copy of the new bulletin, circle number 11 on CF's Information Service card, page 71.

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### Bulk and Bag Delivery Body

A new C-70 series of bulk bodies designed for plant to dealer service, as well as farm delivery, has been announced by the Simonsen Manufacturing Company. This equipment is available in 5 to 15 ton capacities, in single and tandem models.

Certain design and construction features make this C-70 series rugged enough to handle both bulk fertilizer and bulk feed. For instance, heavy duty industrial type hydraulic equipment makes it possible to deliver bulk pelleted fertilizer to farmers or spreader trucks.

Capacities of hydraulically driven augers have been increased to the extent that it is possible to unload 1,500 pounds per minute. This increased output saves considerable time on deliveries where large tonnages are involved.

Sides are so rigidly constructed that there is no need for cross chains. Sides are also designed to provide multiple compartment arrangements every six inches. Full open endgates make it easy to use a pallet tractor for sacked orders. Overall lower height of the C-70 clears 10 foot doors, and unloading auger is set to one side for easier sack loading.

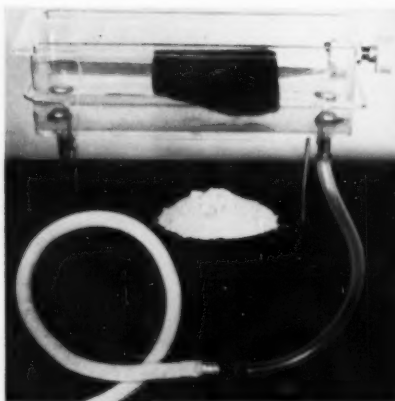
Three compartments and three floor traps are standard extra floor traps can be obtained as optional equipment, as well as a twin post hoist and a reversing mechanism for the floor auger, so that bulk material can be unloaded into a pit.

Full information, including specifications and prices, can be obtained by circling number 12 on CF's Information Service card, page 71.

### Thermocouple Catalog

A new catalog outlines Honeywell's new 'MegopaK' line of hard-pack, small-diameter, mineral-insulated thermocouples. The catalog contains specifications, ordering information and prices on 'MegopaK' bulk material, elements and complete assemblies.

For a copy of Catalog G 100-4, circle number 13 on CF's Information Service card, page 71.



### Underground Watering and Feeding Unit

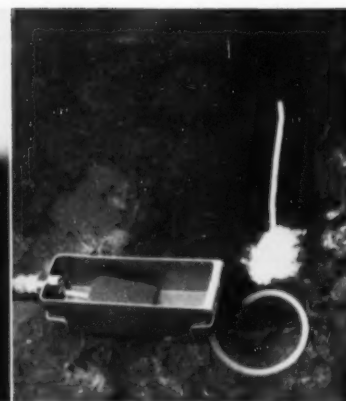
An automatic underground watering and fertilizing system for trees, shrubs and gardens has been announced by the Hartflow Division of the Hartglas Company.

Heart of the system is a tube fabricated of Fibreglas yarns buried underground and closely surrounded by a powder, identified by the trade name, Hartseal. This combination allows water to wick into the surrounding soil only when it falls below 'field capacity,' moisture condition for best growth. The Fibreglas yarns are manufactured by Owens-Corning Fibreglas Corporation.

This automatic moisturizing extends 18 inches in every direction from the tube, buried six to 12 inches beneath the surface of the ground. The Fibreglas yarns of the tube, given hoop strength by stainless steel wire, are impervious to moisture, alkalis and acids, and do not provide sustenance for insects, worms or rodents.

A small plastic reservoir with automatic float assembly, located in the garden area, maintains a constant supply of water in the underground Fibreglas tube. A standard garden hose or permanent underground copper tubing brings water to the reservoir.

This reservoir also provides a receptacle for periodic additions of water-soluble fertilizers. For the first time, therefore, it is possible to quickly and easily make fertilizer available to the entire root mass on a continuous basis. Healthy growth



under these conditions is spectacular.

Also very promising, Hartglas says, is the use of the system to carry insecticides into the soil and root mass; pesticides added to the reservoir can provide control of soil-borne diseases and insects below ground level.

Two years of testing has proved the system works as well for trees and shrubs as it does for flower gardens, according to the manufacturer.

The complete basic kit will irrigate an area of 30 square feet and is expected to retail at approximately \$15. Extension kits to increase the area served by one reservoir are also available.

For full information, circle number 14 on CF's Information Service card, page 71.

### Front-End Loader

A new 16-page pamphlet describes performance and applications of J. I. Case Company's Model W-5 loader, which features 3000 pounds carry capacity. The brochure covers increased traction, weight distribution and lateral stability of the vehicle. It also outlines maneuverability, breakaway force, simplicity of operation and other features of the tractor shovel.

For a free copy of this new literature on the Case W-5, circle number 15 on CF's Information Service card, page 71.

### Small-Package Weighing Unit

A new scale, used in conjunction with automatic packaging, is the Merco-Weigher, manufactured by Mercury Heat Sealing Equipment Co., and capable of automatic measures within 1/64 of an ounce. Its particular design is versatile, permitting it to be adapted to practically any kind of automatic conveyor line operation for the weighing and packaging of a variety of materials. Weighing capacity is 5 lbs. Triple units operate simultaneously and accurately adjustments are made quickly and easily. Steel and aluminum construction make it a durable and long-lasting unit, with a minimum of maintenance.

The Merco-Weigher can also be-



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come an integral part of the Verti-Pak, which forms a bag then weighs, fills and seals up to 45 packages per minute. Operation is completely automatic; adjustments are easily made for variable bag sizes and materials.

For further information, circle number 16 on CF's Information Service card, page 71.

#### **Meters, Feeders, Controls**

B-I-F Industries has just published a new 8-page general bulletin which provides capsule information about many of its products and systems.

Butterfly valves, supervisory control systems, totalizing meters, water and waste treatment equipment & systems, flow meters, process instrumentation, feeders for solids and liquids and blenders for liquids are covered.

For your free copy of bulletin Ref. No. 0001.20-1, circle number 17 on CF's Information Service card, page 71.

#### **Process Industries Catalog**

General American Transportation Corporation's new 1960-61 catalog of services and products for the process industries is available for distribution.

Among products and services covered in the three-color 20-page brochure are their Louisville dryers and coolers, mixing devices, tank and dry bulk rail cars, custom fabrication by their plate and welding division, field erection, and research and development services.

For a free copy of this new catalog, circle number 18 on CF's Information Service card, page 71.

#### **New Van-Tank**

Transicold Corporation, manufacturer of transportation refrigeration equipment, has recently added the Van-Tank to its line of products and is now scheduling demonstrations of this new product throughout the U. S. This flexible liquid container makes it possible to carry practically all types of liquids in any type of trailer.

Capable of carrying 4,600 gallons in the 34 foot size, the Van-Tank is fabricated by Goodyear from time-tested and time-proven materials. It is molded of coated nylon fabric and vulcanized to produce an amazingly strong yet flexible seamless one piece unit.

The Van-Tank makes it possible to carry liquids in one direction and can then be folded into a compact unit for return trip with a dry freight load.

To obtain information, circle number 19 on CF's Information Service card, page 71.



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### **BULK FERTILIZER HANDLING EQUIPMENT**

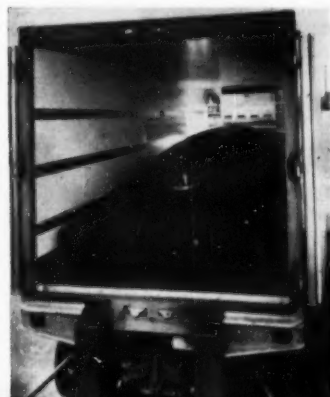
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## ARIZONA

Arizona Fertilizer and Chemical, Phoenix, has a line of redesigned packages which offer better visibility and at the same time avoid the heavy extra cost when a bag has over 45% ink coverage on both sides. The illustration on this page shows the new designs laid out for them by Union Bag-Camp Paper which has effected savings as much as \$627 per carload of multiwall bags.

## CALIFORNIA

California Spray Chemical will be ready soon to go into operation with the new Yuba City structure. This includes, in addition to 8400 square feet of office and warehouse space, an aqua converter, a mixing plant for various formulations of liquid fertilizers, and tank storage for ammonium nitrate and calcium ammonium nitrate solutions. The plant, a \$115,000 project, will be ready by Fall, according to branch manager Joseph Holob.

## FLORIDA

Hydro Chem-Spray Corp., Tampa, has been formed to handle the sales and service of new fertilization formulas developed by Hydro-Chemical Research Corp., headed by Col. Max J. Mackler.

The new products are the result of several years research by a team of chemists, bio-chemists and two big testing laboratories.

The Gro-Mor Company, Plant City, suffered a fire recently which took three hours for firemen to put out. Report is that the fire erupted spontaneously in a mixture of nitrate of soda and sludge. Building damage was limited to about \$2,000 but extensive damage was done to fertilizer materials which had been un-

loaded at the plant only the day before, according to the owner, Alvin H. Hinson.

## IDAHO

Bunker Hill's new phosphoric plant at Kellogg will have a new unit added by early next year. Under a deal with Collier Carbon & Chemical, Bunker Hill will produce a high concentrate anhydrous liquid phosphate developed by Collier, and to be produced on their process equipment. Known as ALP this new acid will be turned out at the rate—to begin with—of 5,000 annual tons.

## IOWA

California Spray Chemical will build a \$22,000,000 chemical fertilizer plant at Fort Madison, according to H. J. Grady, president of the parent company. The new facility, according to Mr. Grady, will be one of the nation's largest, employing approximately 200 persons at the start of operations.

The plant will produce nitrogen in various forms. Among them will be complex pelleted fertilizers, prilled ammonium nitrate and anhydrous ammonia. An ammonia plant, a nitric acid plant and facilities for processing phosphate rock are also included in the total operation.

Located on the Mississippi River, the new Calspray operation will have ready access to rail, water and truck transportation. Barges will be used for transporting much of the bulk supply and finished materials.

Production plans for the facility presently call for 300 daily tons of anhydrous ammonia, 150 tons of prilled ammonium nitrate and 600 tons of complex fertilizers. The principal marketing area will be in the North Central group of states.

## KENTUCKY

Monroe County Farmers Service, Tompkinsville, has been incorporated for \$400,000 to deal in feed, fertilizers and farm implements. Incorporators are Ronald Bushong, Elsworth Strode and Wendell Froedge.

## MISSISSIPPI

Dixie Fertilizer awarded to Longhorn Construction their contract for building at Meridian a \$376,914 unit, to which figure must be added \$140,000 for office buildings and grading. The plant, already under construction, will have a 120,000 ton capacity.

## U. S. Phosphoric Products Announces Expansion Plan

The U. S. Phosphoric Products Division of Tennessee Corporation, Tampa, Florida, has announced plans for an expansion of its phosphate processing facilities. The new facilities will increase the phosphate products output of the plant by 50%.

Work will begin as soon as design and engineering is complete, and completion of all work is expected by late 1961 or early 1962.

The program provides for increased production of triple superphosphate, phosphatic fertilizer solution, and Di-MoN.

This expansion will continue U. S. Phosphoric Products' position as the leading producer of high analysis phosphate products for the expanding fertilizer industry.



The new designs of Arizona Fertilizer and Chemical packages, as revised for them by Union Bag-Camp Paper show substantial savings in cost of printing.

city of mixed goods with a 30% organic base.

## TENNESSEE

**Mid-South Chemical Corporation** has announced a \$585,000 expansion of their river-rail-highway terminal on President's Island. This will include an ammonia storage tank of 9550 tons (3,360,000 gallons) capacity, built of special fine-grained steel so as to permit holding the gas at 28 degrees below zero and approximately at atmospheric pressure. Contractor for the installation is Chicago Bridge & Iron Co.

## TEXAS

**Texas Gulf Sulphur** announced in mid-month the loading of two record sulphur cargoes at its recently completed Beaumont sulphur terminal. This, as our readers know, is equipped to handle both dry and molten sulphur, and is now handling sulphur from all four of the company's Texas mines.

## UTAH

**San Francisco Chemical Co.** will work the huge low-grade phosphate deposit near Vernal, using the methods developed to mine copper. A 6,000 daily ton crushing plant and a 14,000 daily ton flotation plant will be built. Sales are limited to the immediate area, for lack of rail facilities, which means that Western Phosphates at nearby Garfield will be the sole customer for the present—taking delivery by truck.

However, it is persistently rumored, though denied by the railroad management, that the Denver & Rio Grande Western Railroad will build a line from Craig, Colorado to Vernal.

Plans for later on include additional units like the initial operation. Said Robert K Barcus, assistant manager of the concern: "The phosphate deposits are a mining dream. They are regular, uniform, unfaulted deposits. The mining will not present the problems it has in other areas."

## AFRICA

**Sasol**, Cape Town, has decided to stop blowing into the air the hundreds of daily tons of nitrogen by-product of their oxygen plant, and are planning a synthetic nitrogen operation which is slated to be in production late in 1963. They have hydrogen from their coal gasification plant which can be linked with N to make ammonia and various forms of ammonium nitrate for the fertilizer industry.

## BRAZIL

**Russian** experts are counselling with local people on the construction of a plant in the Paraiba Valley which will produce fertilizer and chemicals from bituminous shale.

## BRITAIN

**Fison's** Immingham plant will by next June have completed a \$2,-800,000 expansion of phosphoric acid production facilities. Following modification of a present triple superphosphate plant, ammonium phosphate will also be produced there for the first time. Installation of dockside facilities and additional storage will expedite turnaround.

## FRANCE

**Societe Chimique de la Grande Paroisse** will operate a 250,000 annual ton fertilizer plant which is expected to be completed at Donges by 1962. The location was chosen for the easy accessibility to hydrogen and limestone.

## HUNGARY

**Bonsad Chemical Combine** will invest 735,000,000 forints and double their production. Their fertilizer plant is already the largest in Hungary, and last year avoided the importation of \$5,000,000 of nitrogenous goods. This year's output is

expected to be 132,000 tons—25% up from original 1960 plans.

## INDIA

**Sindri** has been devilled by a shortage of coking coal which probably has cut production for the year from 330,000 tons to 275,000. Designed to run on a type of coal for which the steel industry gets precedence, they have been forced to operate with low-grade coal, which cuts plant efficiency.

**The Rourkela Steel Project** in Hindustan has added a new air separation unit. Nitrogen will be a by-product here, and a fertilizer plant is already under construction.

**West Bengal's** government and **Mitsubishi Bhusan Kaisa**, Japan, will jointly build at Durgapur a plant to produce 100,000 annual tons of urea, and 60,000 of nitrogen phosphate from coke oven gas.

**G. D. Birla**, Indian industrialist has negotiated an agreement which within months should result in the building of a \$55,000,000 fertilizer plant in India capable of producing 200,000 annual tons.

**Simon-Carves** has contracted to build at Madras an \$8,400,000 plant which is to turn out ammonium

## New Southwest Potash Plant in Mississippi To Produce Fertilizer-Grade Nitrate of Potash

**American Metal Climax, Inc.** will construct a new \$7,000,000 plant in Vicksburg, Mississippi to produce nitrate of potash and chlorine. Frank Coolbaugh, president, has announced.

The new plant will make nitrate of potash available for the first time at prices in the range of presently used fertilizer chemicals. Employing a new process, the plant will be operated by Southwest Potash Corporation, a division of American Metal Climax.

According to **Thomas W. Childs**, president of Southwest Potash Corporation, the new process has been under development for five years and has been pilot-plant tested in association with **Jacobs Engineering Co.** and the **Colorado School of Mines Research Foundation** at Golden, Colorado.

**Mr. Childs** said that engineering and construction of the Vicksburg facility will begin immediately, and that operations are scheduled to begin in October 1961. The plant will be located adjacent to the local operations of **Spencer Chemical Com-**

**pany** and the main line of **Illinois Central Railroad**.

Nitrate of potash is one of the best fertilizer materials for many crops with important potentialities in high analysis mixed fertilizers. The product has not heretofore been used extensively because of its high price. It contains two of the three primary elements essential for plant growth—potash and nitrogen. Its combined potash-nitrogen plant nutrient values of 60 percent make this compound one of the most highly concentrated plant foods available.

Nitrate of potash is expected to find wide use in the formulation of fertilizers for tobacco, citrus, truck and other farm crops which require potash free of chlorine and sulphur and nitrogen in the nitrate form.

The plant will be constructed and engineered for easy and economical expansion, and for the production of associated chemicals.

The Vicksburg plant represents Southwest Potash Corporation's initial venture into chemical production.



phosphate-based compound fertilizers to the volume of some 51,000 annual tons.

## ITALY

**Fertisa**, Callao, has gone into production. The plant was designed, built and put into operation under the direction of Montecatini. It produces nitrogenous fertilizers from fuel oil using the Montecatini process. Output, after production of 20,000 annual tons of ammonia, is 15,000 annual tons of ammonium sulphate, and 54,000 of nitric acid.

## KOREA

**Choonjoo** is having its troubles. Just back in production after a shutdown of 43 days due to mechanical troubles, it now faces the fact that Minister Chung Soo Oh is firing five ranking officials for their part in rigging the March presidential elections.

## MEXICO

**Hooker Chemical** last month inaugurated the plant near Mexico City—Hooker Mexicana S.A., which was modelled largely after their plant at Dallas, Texas, and makes the same products for fertilizer manufacturers

and others. The new Mexican facility, among its products, lists phosphoric acid, sodium tripolyphosphate and tetrasodium pyrophosphate.

**Quimica Agricola del Pacifico, S.A.**, last month dedicated their new liquid fertilizer facility, with a capacity of 2,500 hourly gallons. The expansion represents an \$80,000 investment, according to Roberto Mazon, general manager.

## NETHERLANDS

**Albatros Superphosphate Works** has officially opened its new Rotterdam plant which produces, on the TVA process, 80,000 to 90,000 annual tons of NPK. The plant cost 3,500,000 guilders.

## PAKISTAN

**Fenchugun Fertilizer Factory**, the Rs. 26-crore Pakistan fertilizer plant, which is not too far from completion now. It is scheduled to produce 117,000 annual tons of urea. Kobe is supplying the steel; Mitsubishi is doing the power plant; Gammons of Britain are building huge concrete bases—and are, of course, the site engineers. The project at this stage has a population of 10,000 . . . all

hard at work under blazing sun, 7 miles from the nearest railroad, without even a road in between.

## SCOTLAND

**Scottish Agricultural Industries** is to reconstruct its Sandilands plant at Aberdeen at a cost of more than a million pounds. The plant is 110 years old, and was taken over by SAI in 1928.

After reconstruction the plant will switch to complete concentrated fertilizers, instead of the superphosphate base goods now being made there.

## SYRIA

**Part of the U.A.R.** five-year plan, the Soviet Union will build and equip an \$8,000,000 nitrogen plant near Homs. Starting capacity is to be 45,000 annual tons; later this will be extended to 120,000 annual tons.

## TUNISIA

**Haelsingborg**, Swenden, via a Tunisian subsidiary, will build at Sfax a 100,000 ton superphosphate operation, figured to cost 35,000,000 Swedish crowns. Construction is expected to take several years. Tunisia is rich in low-concentrate phosphate.

## Gilman-Kraft Announces Big Paper Production Expansion

Last month, Gilman Paper Company's executive vice-president—operations, Charles Gilman, Jr., announced a multi-million dollar capital expenditures involving important mill additions. This activity is concentrated at their operation at St. Marys, Georgia, and will enable them to transfer to that point some of the specialty grades of kraft now being made in the Vermont plant.

The Vermont plant will also be expanded in capacity so that addi-

tional grades of paper may be produced there.

The expansion at St. Marys Kraft Corporation includes a new third machine for the manufacture of light, medium, and heavy weight unbleached kraft papers, dynamically balanced for speeds in excess of 2,000 feet per minute.

The project involves a building approximately 600 feet long to house this paper machine, complete refin-

ing equipment, chemical additive plant, and a new roll grinding shop. The new building will be of brick and glass block construction to harmonize with the other St. Marys buildings. Provision is being made for a fourth paper machine in this building at a later date.

Steam, electricity, pulp, and other facilities necessary for the machine are already in existence. The new paper production can be channeled into Kraft's new multiwall and grocery bag plant at St. Marys.







*As Cyanamid's "walking giant" scoops away overburden covering a rich phosphate deposit, the surveyor plans a system that will handle the huge amount of water needed to make slurry and move it to washing and grading plants*

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*Like all the men and women in Cyanamid's phosphate operation,  
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He's one of several hundred Cyanamid people who mine, process, research, deliver and service phosphatic materials for your acidulation and mixed fertilizer business. These people put Cyanamid's more than 40 years of phosphate experience into the kind of products and services you can use. Take advantage of both. Pick up your phone and call your Cyanamid representative.

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**Traffic Service:** Cyanamid traffic specialists are ready to route and ship your orders without delays. Their knowledge can save you money and can make your oper-

ation run even more efficiently.

**Technical Service:** Cyanamid's staff of technical experts are on 24-hour alert. Often, what are new problems to you are solved problems to them. Make your formulation and production problems theirs. That's their job.

**Sales Service:** Cyanamid sales representatives are available to work with and for you in expanding present markets or in establishing new markets.

**Products that serve:** Cyanamid's only phosphate business is mining and manufacturing the highest quality products for your mixed fertilizer requirements.

- Florida Natural Phosphate Rock.

- TREBO-PHOS® — Triple Superphosphate.

- Phosphoric acid for acidulation. *To manufacture fertilizers that sell...mix with Cyanamid's phosphates and service.*

American Cyanamid Company, Agricultural Division, N. Y. 20, N. Y. \*TREBO-PHOS is American Cyanamid Company's trademark for its triple superphosphate.



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The logo consists of the letters 'C' and 'I' in a large, bold, serif font, with an ampersand '&' positioned between them. The letters are white and stand out against a dark, rectangular background.

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**Ammonium Nitrate**

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**Nitrogen Solutions**

**Complex Fertilizer**

(PEC Process)

**Phosphoric Acid**

(Prayon Process)

**Sulfuric Acid**

**Ammonium Phosphate**

**Oxygen**

**Fume Eliminator**

**Oil Absorber**

Existing plants designed and constructed by C & I are represented here by the flags throughout the world. Due to the Earth's curvature, some of the plants cannot be shown.

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## IMC Buys Plants At Two Minnesota Cities

International Minerals & Chemical Corporation has announced the purchase of Welcome Agricultural Chemical Company's fertilizer plants at Welcome and Marshall, Minn.

IMC will continue these operations and will add two premium plant foods, Rainbow and Super Rainbow, to the product line.

R. A. Francher, general manager of the Welcome plant, and Kenneth Verschnetze, general manager of the Marshall plant, will continue with IMC to supervise plant production and to handle local sales.

International Minerals & Chemical Corporation, with headquarters in Skokie, Illinois, has 70 plants in the United States, Canada and Mexico, including 27 fertilizer plants.

## Simplot Acquires Anaconda Facilities

The Anaconda Company and the J. R. Simplot Company have announced that Simplot has acquired the entire fertilizer plant facilities of The Anaconda Company at Anaconda, Montana, and has leased Anaconda's phosphate properties at Conda, Idaho, on a long-term basis.

The Anaconda line of fertilizers will continue to be available and Anaconda will operate the phosphoric acid and ammonium phosphate facilities at Anaconda for Simplot. Marketing will be done by the Simplot Company.

The J. R. Simplot Company has also announced an expansion program now underway at its Pocatello, Idaho fertilizer plant designed to double its present five hundred ton per day phosphoric acid and triple superphosphate fertilizer production to one thousand tons per day, according to W. Grant Kilbourne, vice president and general manager of the minerals and chemical division. This expansion is expected to be completed this year so that the added production will be available for the fertilizer season next spring, Kilbourne said.

## Brooks Rotameter Changes Name

Douglas N. Brooks, president, announced an important change in this company's name to Brooks Instrument Company, Inc. The new name is more definitive of the company's expanded activity and broader service.

Mr. Brooks discussed in detail the company's current expansion pro-

# CHANGES

gram which includes a 7000 sq. ft. addition to its Hatfield Plant. He also stated that excellent progress is being made with a new Canadian plant as well as plans for other manufacturing facilities.

## Spencer Chemical Makes Coal Firm Acquisition

Spencer Chemical Company added extensive coal mining operations to its corporate activities recently with the formal closing of the acquisition of the business and assets of The Pittsburg and Midway Coal Mining Company.

The agreement and plan of reorganization by which the acquisition was effected was approved by Pittsburg and Midway shareholders on June 8 and by Spencer shareholders on June 28, 1960. In accordance with the Plan, the authorized Spencer common stock was increased from 2,000,000 to 5,000,000 shares and a two for one stock split-up in the form of a 100 per cent stock dividend was approved.

## Woods Construction Appointed By Midstate

The Woods Construction Company of Fort Dodge was recently appointed by Midstate Machinery Company to market the new Midstate low-cost fertilizer plants.

These package plants, designed for blending and mixing bulk fertilizer, are designed for installation in any simple steel or frame building and may be purchased on either a do-it-yourself or a turnkey basis.

A wide choice of plant size and design is offered, engineered for one or two man operation with capacities up to 30 tons per hour.

Woods Construction will provide engineering and construction, if desired, and complete installation and service facilities throughout Iowa, Southern Minnesota, parts of Missouri and the Eastern sections of North Dakota, South Dakota, Nebraska and Kansas.

## New Zealand Fertilizer Merger

The N.Z. Farmers' Fertilizer Co. Ltd., proposes to acquire all the capital of the Challenge Phosphate Co. Ltd., in a transaction involving about £1,623,000.

One N.Z. Farmers' Fertilizer or-

dinary £1 share, together with 4s. in cash, will be exchanged for every Challenge Phosphate ordinary £1 share. The current market value of N.Z. Farmers' Fertilizer shares is 50s.

The offer has been accepted by shareholders of the Challenge Phosphate Company.

The combined production capacity of the two companies is about 700,000 tons of fertilizer a year. This includes the capacity of the Kiwi Fertilizer Co. Ltd., Morrinnville, in which Challenge Phosphate holds a two-thirds interest and N.Z. Farmers' Fertilizer one-third.

## PCA Subsidiary Merges With Parent

The recent merger of Potash Company of America Limited, a wholly-owned subsidiary of Potash Company of America with the parent company has been announced by John W. Hall, president of both concerns.

Potash Company of America has acquired all of the assets and assumed all of the liabilities of the subsidiary. This does not increase the responsibility of P.C.A. inasmuch as the parent company had guaranteed the obligations of Potash Company of America Limited. It does, however, indicate that the parent company is determined to move forward with the development of the Canadian property.

The shaft of the Canadian subsidiary located near Saskatoon was bottomed at 3,450 feet in June of 1958. The startup operation of the mine and concentrator began in December of that year and the first shipment of potash was made in March, 1959. The ore mine during the startup period was of the satisfactory grade and thickness indicated by the company's extensive drilling and exploratory work. Primarily because of seepage of water into the shaft it was necessary to suspend operations in the early part of November, 1959.

Cementation Company (Canada) Limited was engaged to control the water flow and secure the shaft. They are now proceeding with the program announced earlier of grouting the entire shaft area. It is estimated perhaps a year will be required to complete the work at a cost of approximately \$900,000.

It is believed this grouting process

is a solution to the water problem encountered earlier and will put this property in condition so that it may be brought into successful operation.

### **Grace Chemical Division Gets New Name**

W. R. Grace & Co. has announced a name change for its Grace Chemical Division. The division's new name becomes Nitrogen Products Division. The personnel will remain the same.

Nitrogen Products Division operates an ammonia and urea plant in

Memphis, Tennessee, as its major chemical manufacturing activity. It has also been assigned the management responsibility for Federation Chemicals Limited in Trinidad, B.W.I. and Caribe Nitrogen Corporation in Puerto Rico. Both of these companies are producers of ammonia, ammonium sulfate and sulfuric acid, while Federation Chemicals also produces urea. In addition, Nitrogen Products Division also operates a number of ammonia distribution facilities in the midwestern part of the United States.

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## **The International Scene**

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The expansion will be part of the Five-Year Economic Development Plan, which is designed to provide a higher per-capita income, offer more jobs and save foreign exchange.

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ly to 1,000,000; phosphatic fertilizers from 82,000 to 400,000.

Fertilizers are, in fact, the major new area in the chemical industry opened to private investors. Right now all nitrogenous fertilizer capacity is in the government's hands. The government would like private industry to account for 200,000 annual tons of the planned capacity by the end of the third plan. A number of U.S. firms are reported to be negotiating to build these plants. Koppers seems closest to closing a deal—a proposed \$50,000,000, 70-80,000 annual tons joint venture with G. D. Birla, top Indian industrialist. In phosphate fertilizers, private industry will take nearly the whole field.

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#### **Looking for Canadian distributors**

Russia, searching for distributors and buyers who can handle their goods in Canada lists a number of commodities, in which list fertilizer is included. Reports from Canada are that Canadian government officials who have lived in the USSR report that many of their commodities, such as watches, cameras, tools, optical equipment are "often" of excellent quality.

Newest member of the Davison  
team of granulated phosphates...

# 16-48-0

## DAVISON Diammonium Phosphate

**MAKES HIGHER ANALYSIS MIXTURES . . .** than before—and makes them more easily. 16 units of highly soluble NITROGEN—Plus 48 guaranteed units of AVAILABLE  $P_2O_5$ .  
**FOR DIRECT APPLICATION . . .** an exact 1-3-0 ratio—ready to use and sell . . . beautifully granulated.

**FOR DRY MIXING . . .** Davison Diammonium affords the dry blend manufacturer the advantages of an ammoniation plant. A balanced 1-3-0 ratio simplifies formula calculations.

**READY FOR SHIPMENT . . .** right now. Make this profitable new phosphate part of your operation. Call Davison in Baltimore today at SARatoga 7-3900.

**W.R. GRACE & CO.**  
DAVISON CHEMICAL DIVISION  
BALTIMORE 3, MARYLAND



Some formulations of ratios in higher analysis grades using DAVISON 16-48-0

Ratio Analysis	Pounds of Material Required			
	16-48-0	Ammo. Sol. (21%N)	Triple (46% $APA$ )	Potash (60% $K_2O$ )
1-1-1 14.4-14.4-14.4	602	917		481
1-3-2 11-22-22	917	349		734
1-4-2 8.5-34-17	1063		370	567
1-4-4 6.6-26.5-26.5	828		290	882

\*Other higher analysis nitrogen materials (urea and ammonium nitrate) may be substituted in above formulations. Analysis in the more popular ratios, such as 12-12-12, 10-20-20, 6-24-12, 5-20-20, can be manufactured by the addition of granular dolomitic limestone or other materials.

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## Armour

George C. Smith has been named Montgomery division manager of the Armour Agricultural Chemical



Ellington



Smith

Company, succeeding R. A. Ellington, who retired effective July 2, 1960, after 37 years of service.

Announcement of the change was made by H. Vise Miller, vice president and general manager of the firm's fertilizer division.

## Davison Chemical

Robert H. Linderman has joined W. R. Grace & Co. Davison Chemical Division as manager of phosphate rock sales and long range planning in agricultural chemicals, it was announced by D. N. Hauseman, Davison vice president.



Linderman

Mr. Linderman was formerly product manager, phosphate rock, for International Minerals & Chemical Corp., at Skokie, Ill., with whom he had been affiliated since 1946.

William M. Rohrer has been appointed assistant sales manager, agricultural chemicals, Davison Chemical division of W. R. Grace & Co. He joined them on graduation from Yale and has served with two Grace subsidiaries—Naco Fertilizer and Thurston Chemical—before joining Davison in 1954.

Edward H. Sullivan has been named manager of the Davison operations at Fort Pierce, Florida where he has been sales manager since 1950. He replaces A. C. Gordy, one of the former owners of the plant, who will continue to advise and represent the company in sales in Florida.

## Pacific Chemical

W. L. Dixon, Jr., is now general manager and executive vice-president of Honolulu's Pacific Chemical & Fertilizer Co. Robert C. Ching, a director of the parent company and of the Pacific Guano Co., subsidiary, was named vice-president of both concerns.

# PEOPLE in the

## IMC

International Minerals & Chemical Corporation has promoted Sinclair



McCoy

B. McCoy to manager of sales services for the materials department of the agricultural Chemicals division — sales.

Mr. McCoy, former potash product manager, will be responsible for handling administrative details of the materials department, operation of the customer service department, and the duties formerly handled by product managers of potash and phosphate. He is a 33-year veteran with IMC.

IMC also has promoted John M. Maschoff, Jr., to district sales manager of its plant food division, with headquarters at Winston-Salem, N. C.

Mr. Maschoff succeeds John F. Carroll, who retires October 31 after 42 years service with IMC.

For the past two years, Mr. Maschoff has been sales supervisor at Winston-Salem, and previously was sales representative and credit manager at Tupelo, Mississippi, and Florence, Alabama. He joined IMC in 1954.

## Florida East Coast

Edward J. Norman recently retired after 15 years of service as grove supervisor for Florida East Coast Fertilizer Co., Homestead, Fla.

## National Phosphate

Erol Beker, president of National Phosphate Corporation, Marseilles, Illinois, has announced the appointment of Dever P. Biggerstaff to the position of plant manager.

Mr. Biggerstaff graduated in 1942 from the University of North Carolina from 1942 to 1944 he was with the General Chemical Company; 1944 to 1946 he was in the United States Navy; and from 1946 to 1951 he was again with General Chemical Company; from 1951 to the present he was employed by the Davison Chemical Division of W. R. Grace & Co., as Production Supervisor of sulphuric acid, phosphoric acid, triple superphosphate and diammonium phosphate

## Raymond Bag

Fitzhugh Prescott has joined Raymond Bag Corporation, Middletown,



Prescott

Ohio, as salesman in the mid-western district. He previously represented International Paper Co., Bagpak Division, and for the past several years has been with McLouth Steel Corp., Detroit, Michigan.

Mr. Prescott's headquarters are in Detroit, Michigan, and he will represent Raymond in Michigan, Northern Indiana, and Northwestern Ohio.

## Canadian Industries

Dr. A. W. Birnie has been appointed technical manager of the agricultural chemicals division of Canadian Industries Limited. He replaces K. A. Shantz who is now the division's production manager.



Birnie

Dr. Birnie joined C-I-L in 1946 as a research chemist at the company's central research laboratory at McMasterville, Que. and has held various administrative posts with C-I-L's research department and textile fibres division.

## Canadian Control Office

W. S. McLeon, for the past eight years in charge of the Ottawa pesticide testing laboratory of Canada's Department of Agriculture, has been appointed supervisor of the pesticide unit, Plant Products Division. He succeeds C. H. Jefferson, who has become chief of the Division's feed, fertilizer and pesticides section.

## Arkansas Plant Board

Paul H. Millar, chief inspector and disbursing officer of the Arkansas State Plant Board, which has had jurisdiction over the inspection of feed and fertilizer in Arkansas since 1949, has retired. Robert W. "Bob" Anderson, who had been head of the seed certification and inspection division and was also the main assistant to Mr. Millar, succeeds the long-time chief.

# INDUSTRY

## India Phosphate Scheme

Dr. Vincent Sauchelli, chemical technologist for NPFI, leaves the middle of this month for a six month trip to India. Working for the India Phosphate Scheme, his function there will be to impress on Indian authorities the economic virtues of high analysis superphosphates and mixed fertilizer.



Sauchelli

## Owens-Illinois

John R. Murphy, former manager of the plastic bag operation of the multiwall bag division of Owens-Illinois has been promoted to general sales manager of the division. He succeeds W. H. Morris who has been promoted to vice president of the Mill Division in charge of container board sales. Mr. Murphy joined the Multiwall Bag Division in 1954.

Philip Williams, assistant general sales manager for the multiwall bag division has been named sales promotion and advertising manager, in a new position. J. C. O'Neal, Jr., production supervisor at the Valdosta, Georgia, plant will succeed Mr. Williams as assistant general sales manager.

## Simplot

J. R. Simplot Company has appointed Bernard L. Brown as agronomist for the minerals and chemical division. He has been extension soils specialist at Montana State, especially active in developing the soil testing program and intensified fertility program in that state.

## Texas Gulf Sulphur

Ira E. McKeever has been appointed general manager of sulphur operations of Texas Gulf Sulphur Company, Fred M. Nelson, chairman, has announced. Mr. McKeever, who will be headquartered at Newgulf, Texas, will have direct charge of sulphur operations at all locations in the Gulf Coast region. In his new position, he will act under direction of and will report to Hugh W. Strickland, who is vice president in charge of all company activities in the region. Mr. McKeever joined Texas Gulf in July 1952.

## Sohio

James W. Bibbins has been appointed manager of agricultural sales, it was announced by H. J. Coleman, sales manager of the Sohio Chemical Company.

Mr. Bibbins joins the Sohio Chemical Company after having served as branch manager for the Northrop, King & Company for the past two years. Prior to his association with Northrop, King & Company, he served with Central States Seed Service Company as vice president in charge of sales.

John A. Sherred has been named manager of the market research and product development division of the Petrochemical Department of The Standard Oil Company (Ohio), according to an announcement by vice president Edward F. Morrill, who is also president of the Sohio Chemical Company. Mr. Sherred will make his office headquarters in Cleveland.

Mr. Sherred was with Shell Oil Company for eight years in various assignments in Europe and the United States, and for the past 12 years has been with Monsanto Chemical Company, most recently as development director of the Lion Oil division.

## PCA

George A. Lux has been made chief industrial engineer for Potash Company of America, effective the first of this month, production vice-president H. N. Clark has announced. This is a newly created post, designed to provide the line management staff with service in the fields of management sciences, industrial and methods engineering. Mr. Lux has been with PCA since 1935.

## Velsicol

Velsicol Chemical Corporation has announced that Curtis N. Overton has been appointed sales representative for their Agricultural Chemicals division, to provide additional sales and technical service for customers in the middlewestern states.

Mr. Overton was formerly a technical sales representative for California Spray-Chemical Corporation.

Velsicol has announced the appointment of Dr. Warren H. Zick as agronomist-herbicide specialist in the company's research and development department.

## Commercial Solvents

R. Paul Jolley has been named manager of the Atlanta district office of Commercial Solvents Corporation, according to an announcement by W. Ward Jackson, vice president of sales for the Company.



Jolley

Mr. Jolley joined CSC in 1959 as a sales representative for the Company's agricultural chemicals department. In his new capacity he will direct the sales activities of CSC salesmen handling industrial and agricultural chemicals, and animal nutrition products in the states of Florida, Alabama, Georgia, South Carolina, and North Carolina.

Prior to joining Commercial Solvents, Mr. Jolley was associated with the Georgia Department of Agriculture as Chief Fertilizer Control Official. He had previously been with the Virginia-Carolina Chemical Corporation.

## American Cyanamid

A new addition to the staff of plant industry development has been announced by Dr. John F. Yost, director. Dr. Harry E. Scott has joined the Agricultural Division of American Cyanamid as an entomologist and will be primarily concerned with special insecticide development problems.

He comes to Cyanamid from North Carolina State College where he was extension entomologist for the past seven years. Prior to this, he was a research advisor with the Canadian Department of Agriculture in Ottawa for five years.

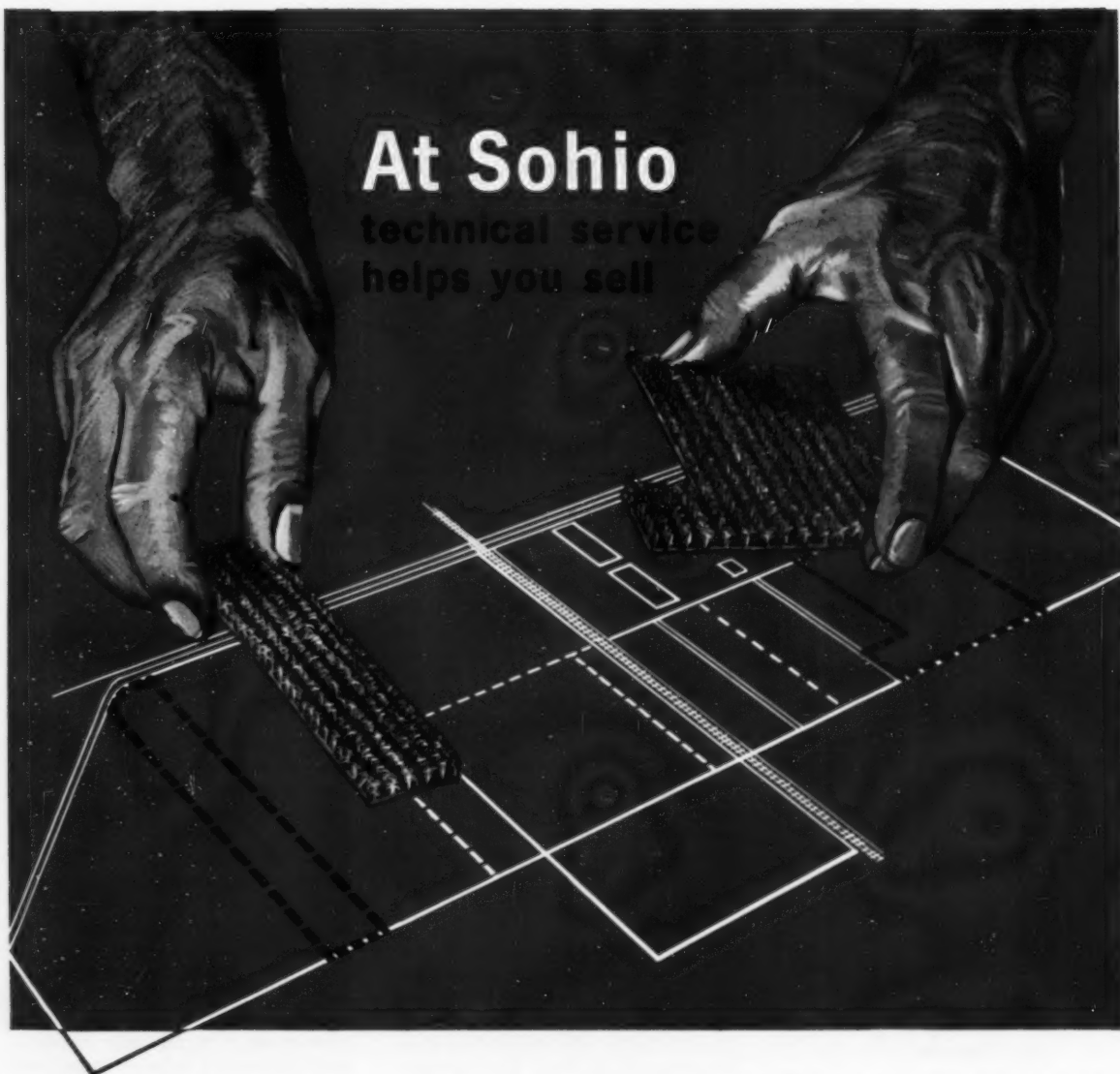
Basil Snider has been named general superintendent of the American Cyanamid plant at Fortier, Louisiana.

## U. S. Borax

Appointment of William Ernest Mooz as an economic engineer in the Los Angeles headquarters office of United States Borax & Chemical Corporation is announced by P. J. Maddex, chief engineer.

Appointment of John T. Young to the newly-created position of engineering manager at the Wilmington (Calif.) refinery is announced by Dr. D. S. Taylor, vice president, technical department, who also announces appointment of R. E. Kendall to the newly-created position of engineering manager at the Boron (Calif.) mine and processing plants.

Charles Lester Friedmann has



At the Farm Progress Show, Sohio's technical service staff demonstrates the value of your complete fertilizers . . . adds the benefits of Sohigro® Urea.

At Sohio we concentrate on giving technical service that does more than solve formulation or mechanical problems. As you'll discover when you talk to the "Man from Sohio," we are sincerely interested in helping you in any way we can. To produce better products. To sell them at a good profit. To help you build your markets. One example is this year's Farm Progress Show. Every growing display of Sohigro Urea promotes and sells the complete fertilizer story. Your story is our story. That's why technical service at Sohio also has a flair for selling.



See the whole Farm Progress Show from Sohio's vantage point. Visit the corn fields where you'll see growing proof of the value of Sohigro Urea when used with complete fertilizers. See the bumper crops of hybrid corn produced by total fertilization. Sohio takes your story to farmers . . . to seed growers . . . to the farm press. See you at the Sohio exhibit.

*...we're serious about SERVICE at Sohio*  
**SOHIO CHEMICAL COMPANY**  
 Agent for Solar Nitrogen Chemicals, Inc.

Fort Amanda Rd., P.O. Box 628 • Lima, Ohio  
 Phone CApitol 5-8015 or wire (TWX call letters LIMA O 497-U)

23-60



## People...

joined United States Borax & Chemical Corporation as a senior process engineer at the company's Boron (Calif.) open-pit mine and processing plants, it is announced by P. J. Mad-dex, chief engineer.

### Wheelabrator Corp.

Willard P. Burdakin has joined Wheelabrator Corporation, Dust and



**Burdakin**

Fume Control Division, Mishawaka, Indiana, and has been assigned to a seven-state territory including North Carolina, South Carolina, Georgia, Tennessee, Mississippi, Alabama, and Florida where he will serve as sales engineer, operating from Wheelabrator's Birmingham Office, 8436 1st Avenue North.

Prior to joining Wheelabrator, Mr. Burdakin spent five years with the Koppers Company, Inc., Metal Products Division, as an electrostatic precipitator sales engineer serving a similar southern territory.

### Bemis Bro.

Several changes in management personnel within the Western operations of the Bemis Bro. Bag Company have been announced by C. W. Akin, executive vice-president:

J. D. Richards, currently production manager at the Seattle bag plant, has been named manager of the Seattle plant and Pacific Northwest sales division located in Vancouver, Wash. E. G. Muir, head of sales development section in the St. Louis general offices, will be transferred to Seattle as assistant manager. J. M. Prudhomme, production manager at the Vancouver multi-wall plant, has been named manager there.

F. W. Ayers, sales manager of the Pacific Northwest sales division, has been transferred to Wilmington, California, to be manager of the company's Wilmington plant and the Los Angeles sales division. L. L. Conrad, Jr., currently sales manager of the Los Angeles sales division, will be transferred to San Francisco as manager of the company's San Francisco plant and sales division.

G. E. Cook, sales representative, will be sales manager of the Pacific Northwest sales division, and R. E.

Revelle, sales representative, will be sales manager of the Los Angeles sales division. A. H. Silvernail, Jr., will remain as sales manager of the San Francisco sales division.

### G.L.F. Soil Building

John R. Porter, director of the Plant Food and Seed Division, Farm Bureau Service Company of Iowa, will become manager of G.L.F. Soil Building Division when John C. Crissey retires December 31.

In making the announcement, G.L.F. Director of Wholesale Charles H. Riley said Mr. Porter is in Ithaca now in order to familiarize himself with G.L.F. operations before he assumes his new post.

Mr. Crissey, Soil Building Division manager since 1941, joined G.L.F. in 1925. He is president and a director of Fertilizer Manufacturing Cooperative, Inc., Baltimore, in which G.L.F. is an investor. He is a former director of the National Plant Food Institute.

The G.L.F. Soil Building Division operates 13 plants in New York, New Jersey and Pennsylvania engaged in the manufacturing of fertilizer, weed killers and insecticides.

Mr. Porter has headed fertilizer operations of the Iowa company since 1957. He joined the organization in 1949 and held managerial positions in its retail system before moving to the plant food division in 1954.

Active in organizing a fertilizer council of Iowa's state, industry and college personnel, he was first chairman of the council.

### General Chemical Div.

Appointment of William E. Houghton as sales manager for basic industrial chemicals produced by Allied Chemical's General Chemical Division has been announced by Frank J. Woods, Jr. director of sales.



**Houghton**

Mr. Houghton, with the division 27 years, will be responsible for sales of phosphoric acid, aluminum sulfate, aluminum chloride and aluminum nitrate solutions, ammonium and potash "alum," and a variety of sodium compounds.

Mr. Houghton was manager of General's Philadelphia sales office for nine years prior to coming to the division's New York headquarters as assistant sales manager in 1959. Earlier he served for five

years as assistant manager of the New York sales office.

### V-C

Virginia-Carolina Chemical Corporation has promoted three men in its fertilizer division and another in its bag division.

W. M. Atkinson, formerly supervisor of the Company's fertilizer sales offices in North Carolina, has been named assistant general sales manager. Mr. Atkinson moved to V-C's general sales department in Richmond, Virginia, last year.

Stan K. Thomsen, formerly a V-C salesman out of Estherville, Iowa, has been named assistant to manager at the Company's Fort Wayne, Indiana, sales office to replace Don Kingsley who has been transferred to the triple superphosphate department and J. D. Moseley, formerly a salesman out of Montgomery, Alabama is now assistant to manager in Shreveport, Louisiana.

### Farm Bureau Co-op

Vernon H. Davis, horticulturist for the fertilizer manufacturing division of The



**Davis**

Farm Bureau Cooperative Association, Inc., retired July 1, at the age of 83, after 20 years of service with the cooperative association.

Mr. Davis received his Bachelor's degree in Agriculture at Ohio State University in 1900 and his Master of Science degree in Pomology from Cornell University in 1901. He was Professor of Pomology at Ohio State University for 16 years and later served as the Chief of the Bureau of Markets for the Ohio Department of Agriculture for two years.

Mr. Davis plans to spend his retirement in visiting his two daughters, doing some fishing and continuing his interests and activities in horticulture.

### Dorr-Oliver

J. Delano Hitch, Jr. has announced his resignation as chairman of the board of directors of Dorr-Oliver Incorporated, Stamford, Connecticut. Mr. Hitch, formerly president of Dorr-Oliver, will continue to be active as a director and as a consultant under long-term contract to the corporation. No successor as chairman has been elected.

A series of reassignments in the top-level organization of Dorr-

(Concluded on page 88)

## People...

Oliver directed toward centralization of related functions took effect on July 1, according to an announcement by Lloyd R. Boling, president of the corporation.

William J. Fox, now vice-president—engineering, assumed the newly created post of vice-president—domestic operations. Douglas C. Reybold will assume responsibility for the research, development, legal and patent functions.

Centralization of the activities of the overseas subsidiaries has been strengthened with the appointment of H. J. Talbot as managing director, Europe. Mr. Talbot is managing director of Dorr-Oliver Company, Ltd., the D-O British subsidiary. G. E. A. Schroth, managing director of Dorr-Oliver N. V., the Netherlands subsidiary, will be deputy director—Europe.

The company has also announced a number of promotions and new assignments in engineering.

Harry E. Lundberg has been named director of engineering, replacing Glenn O. Wilson, who has been appointed to the newly created post of director of technical coordination. Jack S. Chasteen has replaced Mr. Lundberg as manager of filtration engineering. Charles A. Schreiber has replaced Mr. Chasteen as manager of engineering coordination.

The general equipment engineering division has been split into two units: Russell C. Raynor heads the new sedimentation engineering division and Philip B. Booth heads the reorganized general equipment engineering division. William A. Hirschfield has replaced Mr. Booth as manager of Fluo-Solids engineering.

## IMC Executives on 'Good-Will' Tour

Fourteen executives of International Minerals & Chemicals Corporation, and their wives, are making a 15-day, 5-country tour of Western Europe as part of President Eisenhower's People-to-People Program for building friendships abroad.

The production and sales executives from all over the nation were chosen for outstanding performance to represent the corporation in Europe. The tour, August 1 to August 15, sends the 'good-will ambassadors' to England, France, The Netherlands, West Germany and Italy.

Heading the party from IMC's Skokie headquarters are Anthony E. Cascino, marketing vice president, and E. C. Horne, sales manager of the materials department in the Agricultural Chemicals Division.

Other members of the party are: William W. Chadwick, regional sales manager, Ho-Ho-Kus, N. J.; Gerd W. Kraemer, regional sales man-

ager, St. Paul, Minn.; Jack W. Lindsey, regional sales manager, Shreveport, La.; William E. Lane, district sales manager, St. Paul, Minn.; Robert A. Hauerman, district sales manager, Briarcliff Manor, N. Y.; Alexander McBride, district sales manager, Knasas City, Mo.; Harold Hoffman, district sales manager, Shreveport, La.; Basil Surgent, district sales manager, Baltimore, Md.; Melvin Kartchner, manager of mining operations, and William Lawhon, chemical plant general foreman, Carlsbad, N. M.; James Patrick, manager of minerals planning, and Harry M. Feigin, administrative manager, Bartow, Fla.

A dinner with foreign diplomats in Washington, D. C., and a meeting with U. S. Department of State foreign affairs experts preceded the trip.

IMC, world's largest private supplier of fertilizer ingredients, is the first in the industry to send a people-to-people group overseas.

## Regional Safety Schools Begin in Aug.

The first three of the Safety Schools, whose schedule we reported last month, will be held during August. The first of these, in New York City, has laid out a program which may well serve as a model for all five. Subjects to be covered include—the scope of safety work; safety education and training fundamentals—both by professors from the N. Y. State School of Industrial and Labor Relations.

William C. Creel, North Carolina's pioneer safety promoter, will talk about what makes accidents and what management can do about it.

Elmer Perrine, Allied Chemical, will discuss handling of liquid fertilizer materials. Royster's Ed Burroughs, Jr., will have as his subject the maintenance of good order for safety . . . good housekeeping.

There will be the first afternoon the discussion of individual problems by small groups. And the morning of the second day will conclude the school, with Kelvin Kelly of B. F. Goodrich on safety organization and Professor Harlan Perrins on the teaching of good safety habits.

## Farmers Chemical Completes 2 Safe Years

Farmers Chemical Company, Joplin, Missouri, celebrated completion of two full years of operation without a disabling injury June 7 with a crowd of four hundred, representing the employees and their families. They gathered at the plant to hear President Howard A. Cowden deliver the congratulatory address.

Olin Hughes, safety engineer of MFA Mutual Insurance Company, Columbia, Missouri, presented commemorative safety plaques.

Following the addresses, a picnic style Bar-B-Que and an informal entertainment program was held. Individual safety awards were made by Walter R. Horn, FCC general manager, to the employees who made this half-million safe man-hour record possible.

### Schedule of Regional Fertilizer Supervisory Safety Schools

**NORTHEAST August 10-11 Park Sheraton Hotel New York**

Director: Stratton McCargo, G.L.F. Soil Building Service  
Terrace Hill, Ithaca, N. Y.

**MIDWEST August 16-17 Safety Council Hdq. Chicago, Ill.**

Director: Emerson M. Jones, Nitrogen Div., Allied Chemical Corp.  
6060 College Ave., Indianapolis 20, Ind.

**SOUTHEAST Aug. 25-27 Cape Fear Hotel Wilmington, N.C.**

Director: Quentin S. Lee, The Cotton Producers Association  
P. O. Box 2210, Atlanta 1, Ga.

**FAR WEST late October or early November Hacienda Motel Fresno, Calif.**

Director: Austin Cline, Shell Chemical Corporation  
P. O. Box 1451, Ventura, Calif.

**SOUTHWEST late October (to be announced) New Orleans or early November**

Director: to be announced

**SEND A MAN AND \$20 . . . IT'LL BE MONEY WELL INVESTED**

# NEW!

## WEST VIRGINIA'S 1960 STANDARD BAG CONSTRUCTIONS TO SAVE YOU MONEY

Major savings for fertilizer packers are being achieved by three new standard WONDERWALL bag constructions perfected by West Virginia.

During a controlled test to determine possible savings in bag costs, various WONDERWALL constructions were developed in our Multiwall Packaging Laboratory. They were tested by 101 packers who shipped 569,224 tons of fertilizer in 12,307,546 WONDERWALLS.

The three recommended standard constructions and their actual savings, as used in normal conditions, are shown in the box.

For example, where a typical 100# old fashioned kraft bag usually would require 1/90 AL, 2/40, 1/50 for a total of *four* plies, the new standard WONDERWALL provides the same or superior strength with *three* plies: 1/100 AL, 1/40, 1/50 . . . at a saving of \$3.50 per M.

Secret of WONDERWALL's strength is Kraftsman Clupak\*, the paper with the built-in stretch that withstands far more impact without breaking than conventional natural kraft multiwalls. In a WONDERWALL bag, fewer plies are needed to do the job!

See how WONDERWALL standard bag constructions can *cut your costs, increase your profits*. Our technical service experts are ready to help you take full advantage of these new bag developments; call or write Multiwall Bag Division, West Virginia Pulp and Paper Company, 230 Park Ave., New York 17, N.Y.

\*Clupak, Inc.'s trademark for extensible paper manufactured under its authority.



**West Virginia  
Pulp and Paper**

August, 1960

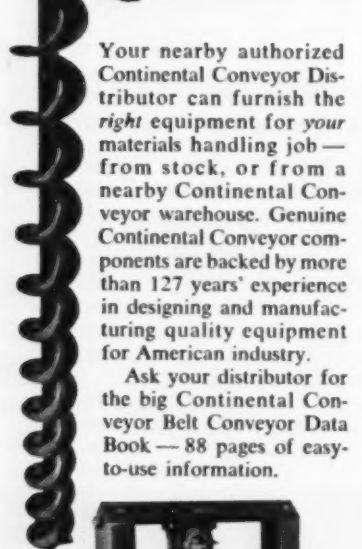
### NEW STANDARD WONDERWALL FERTILIZER BAG CONSTRUCTIONS

Pounds Packed	Old Style Natural Kraft Construction	New Wonderwall	Actual User Savings
100# . . . . .	1/90AL, 2/40, 1/50 . . . . .	1/100AL, 1/40, 1/50 . . . . .	\$3.50/M
80# . . . . .	1/90AL, 2/40, 1/50 . . . . .	1/100AL, 1/40, 1/50 . . . . .	\$3.10/M
50# . . . . .	1/90AL, 1/40, 1/50 . . . . .	1/100AL, 1/60 . . . . .	\$3.80/M

Smith-Douglass Co., Inc., Norfolk, Va., has shipped over 50,000 tons of fertilizer and related products in a million new WONDERWALL 100# standard construction bags. They report excellent results with a saving of \$3.50 per M and reduced bag breakage.







Your nearby authorized Continental Conveyor Distributor can furnish the *right* equipment for your materials handling job—from stock, or from a nearby Continental Conveyor warehouse. Genuine Continental Conveyor components are backed by more than 127 years' experience in designing and manufacturing quality equipment for American industry.

Ask your distributor for the big Continental Conveyor Belt Conveyor Data Book—88 pages of easy-to-use information.



Call on your  
**CONTINENTAL CONVEYOR MAN**  
for help on materials  
handling problems.

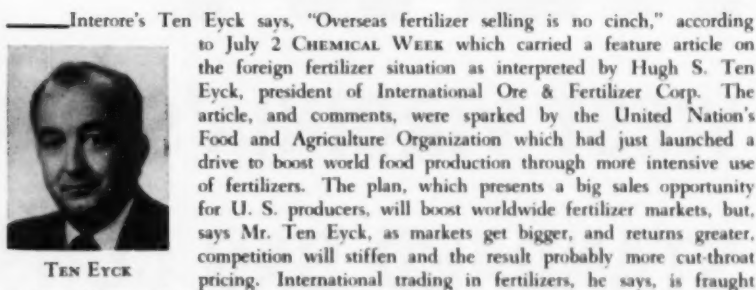


**Continental**  
**CONVEYOR & EQUIPMENT CO.**  
Winfield, Alabama

Sales Offices in: ATLANTA BIRMINGHAM  
DALLAS HUNTINGTON MEMPHIS  
NEW YORK

Formerly Industrial Div., Continental Gin Co.

## —of This and That...



TEN EYCK

with problems and pitfalls.

Hugh Ten Eyck this year became Interore's president (the company is the largest independent firm engaged in international fertilizer trade); R. Stanton is vice president; Doris Robison is manager of the company's phosphate rock division.

One of CF's readers wrote in about an item that appeared in this column (CF May) on J. D. Stewart, Jr.'s recent citation for distinguished volunteer help to the Selective Service System—his idea being that some of our readers might think Jeff chose to be on the Draft Board in place of serving in the Army, Navy or Marine Corps. Just in case you were misled and just for the record, Jeff entered the U. S. Navy as Ensign Nov. '42, and was discharged as full Lieut. April '46. Some of the business activities and organizations to which he gives time and work (other than as president of Federal Chemical Co., Louisville, Ky.) are: Director NPFI, vice chairman of the Board, past president; director Louisville Industrial Foundation; director Brinly-Hardy Company of Louisville; director Lewis Industrial Supply Company of Louisville; Rotary Club; Zeta Psi Fraternity; Member Kentucky Selective Service Board of Appeals; director Louisville Y.M.C.A.; director Norton Memorial Infirmary Corporate Body; past member Anchorage School Board.

Tempest in a teapot—the suit against the Simplot Company brought by Mike Koseris, owner and operator of a night club across from the Simplot plant west of Pocatello, Idaho. The court said Koseris had not actually operated his club since 1951 (it was closed by sheriff's order from 1951 to 1957 as a result of abatement proceedings based on charges it violated state gambling laws). The Simplot company listed capital investment of the plant at some \$5.5 million, a staff of more than 1,000 and an annual payroll of more than \$2,242,000, had spent more than \$223,000 for a fume and dust control system and was continuing its efforts in this direction . . . Since when did gambling have to smell sweet, too?

O. J. (Oyvind Juul) Noer of Milwaukee, whose pioneer research in developing uses for Milorganite, has retired. Known as "Mr. Turf," who spent more time on golf courses than most golfers (but never swings a club), promoted use of Milorganite not only for golf courses but parks, lawns, playgrounds, etc. His retirement is only official as he will continue to work as a consultant.

They are finding new uses for fertilizer every day—now it's creating hope of prolonging the skiing season for the die-hard skier. Cyanamid of Canada has been experimenting with ammonium nitrate to transform soft melting snow into a hardpacked snow surface at a 38 degree F. temperature in less than five minutes. Happy Skiing!

Anyone for a vacation hauling bat guano from Texas caves? (Well, let's face it, you're getting old.). Two sixteeners there have joined forces to capitalize on their knowledge of such caves and are busy mining and marketing it. These two speelunkers (cave explorers) have found out, the hard way, why it's not plentiful on the market in pure form. First, you have to remove it from deep caves in quantities that can be carried, pulled or pushed; secondly, in its natural state it contains so much moisture that each sackful loses over 50 percent of its weight after screening and drying—important since they sell it by the pound. But the two boys have visions of a profitable summer, if their backs hold out. The garage at home serves as their storehouse; mom and dad are happy the product is odorless.



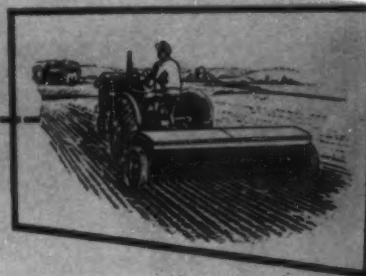
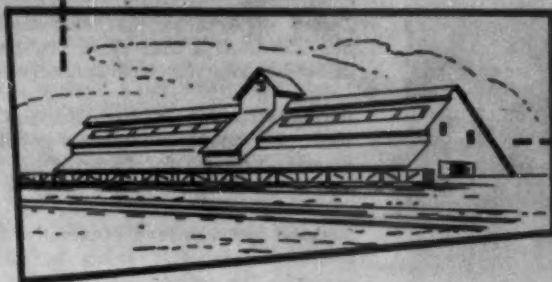


# FERTILIZER CHEMICALS

*From One Basic Source*

**COPPER SULFATE  
MANGANESE  
SULFATE  
ZINC SULFATE  
IRON SULFATE  
MANGANOUS  
OXIDE  
MINERAL MIXTURES**

Our long years of experience in nutritional trace elements for application in fertilizers, backed by a continuing research program to further improve the quality and performance of these products, is your assurance of highest quality materials at all times.



## WITH TENNESSEE FERTILIZER CHEMICALS—

### FOLIAR NUTRITIONAL PRODUCTS—

Iron, Zinc and Manganese Compounds  
— NU-IRON, NU-Z, NU-MANESE and  
ES-MIN-EL (a foliar applied mineral  
mixture).

You cut cost with combined carload lots From One Basic Source—Save time, plant space and labor by using our Custom Formulated Mixtures — Combination of Minerals Mixed To Your Particular Specifications.

Call or write us for further information on Tennessee's Fertilizer Chemicals.



**TENNESSEE CORPORATION**

612-629 GRANT BUILDING, ATLANTA 3, GEORGIA



stop  
shovelling  
away  
profits!



when it's so easy to save  
man hours, eliminate health  
hazards and speed loading  
of box cars with a . . .

**STEPHENS-ADAMSON**  
**SWIVELoader®**

Don't miss the next page for Details!

## Research Briefs

**Micro** fertilizer is being supplied in the USSR from waste of the metal and chemical industries. Boron, copper, manganese, molybdenum and zinc are all recovered from these sources—and supply excellent crop stimulus with low cost.

**Pastures.** CFA quotes from a recent report: "Whatever you do when applying N for the first time on your pasture, do not use less than 50 to 60 units, preferably the higher level."

**Chlorophyll** is being synthesized in West Germany—both blue-green and yellow-green. Harvard University has also announced success in this field. But nobody has found out how to make it perform outside of the plant chloroplast. At least, not yet.

**Corn** may show symptoms of N hunger by mid-August, reports Wisconsin's Professor C. J. Chapman. A side dressing of extra N on soils well supplied with phosphate and potash can step up yield to high-profit levels, he says. And, N as a plow-down treatment before planting has "done more to increase yields than any practice we have recommended or that farmers have carried out."

**Hay** and pasture fields, top-dressed after the first cutting to replace the plant nutrients can pay off in more high quality forage, lower feed costs and extra profit from herds, says Michigan's J. A. Porter.

**Cotton** in Arkansas has demonstrated the power of plant food. Alva Gossage in 1959 proved that for every dollar he spent for fertilizer, seven dollars came back.

**Bermuda** planted on side hills, and fertilized with 10-20-10, 300 pounds to the acre, has solved a grazing shortage problem for Carl Gaston, beef herder in Arkansas.

**Soybean** research may eventually double or triple the present average U.S. yields, by making it possible to prescribe the proper fertilizer use, says Purdue's Dr. A. J. Ohlrogge.

**Pecan** orchards, operated on a small scale should be used to yield diversified crops so as to avoid pests, and make the best use of fertilizers, says a bulletin by J. H. Hunter, USDA researcher at Albany, Georgia.

**Alfalfa** yield was doubled by use of fertilizer containing 200 pounds of phosphate per acre in recent Wyoming tests, conducted by Dr. L. I. Painter of the University of Wyoming. And in central Utah, Snow College field station reports substantially increased yields from superphosphate applications.

**Soil testing** techniques have so vastly improved, and the farmer has been so thoroughly convinced of the value of testing that the practice has grown greatly, says Auburn agronomist, J. C. Lowery. And as a further extension of the work, Kentucky AES soils men are testing a quick method which they call "tissue test." They squeeze plant juice onto filter papers, and read the nutrient level in the color resulting. "This

does not replace the soil test" says N. N. Driskell "but supplements it."

**Cold storage** can preserve the germination and quality of seed as long as four years, Beltsville and the North Carolina AES report jointly.

## More Growing Power In Plant Food Now

Farmers today are getting 76 per cent more nutrients per ton of mixed fertilizer than they got 30 years ago, reports the Midwest division of the National Plant Food Institute.

"Back in 1929, the average of the three primary nutrients—nitrogen, phosphate and potash—in mixed fertilizer, was 17.6 units," says the Institute in a statement based on U. S. Department of Agriculture compilations. "In 1959, the average was 31 units."

This trend toward higher analysis fertilizer explains why prices of plant food have remained relatively low over the years, says the Institute's statement. Meanwhile prices of all items used by farmers in crop production have more than doubled since the 1930-39 period.

"The extra crop growing power in every ton of fertilizer today helps farmers combat the cost-price squeeze by enabling them to reduce their costs of production per acre," says the Institute. "And it is axiomatic that as costs go down, net profits go up."

## TVA Working On New Process For Granular Diammonium Phosphate

Charles H. Young, Tennessee Valley Authority's manager of Chemical Engineering, reports that TVA engineers are developing a new process for producing granular diammonium phosphate fertilizer.

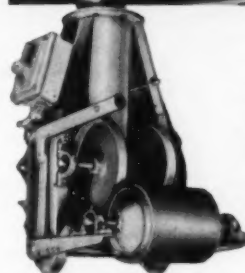
"The process has an advantage over the previously crystallizer method in that it can use low-cost wet-process phosphoric acid without a purification step," he said, "also, the equipment required is more familiar to the fertilizer industry and should be less costly. By taking advantage of chemical heat in the reaction of acid and ammonia, recycle rates and drying requirements are reduced below those of some competitive processes. The grade of the product depends on the purity of the phosphoric acid available, ranging up to 21-53-0 when electric-furnace acid is used. The process is being adapted to the production of various grades, some containing potash."

"The TVA ammoniator is the key equipment in the process. Acid is partially preneutralized in a tank followed by completion of the ammoniation to diammonium phosphate in the ammoniator-granulator drum. Excess ammonia must be fed to the drum to produce diammonium phosphate; therefore, a scrubber is required to recover ammonia from the exhaust gases. The phosphoric acid is fed to the scrubber to absorb the ammonia, and the solution is fed to the preneutralizer. A recycle ratio of about 3 to 1 is required for control of granulation. Physical properties of the closely sized granular product are excellent."

### SHUEY & COMPANY, INC.

Specialty: Analysis of Fertilizer Materials and Phosphate Rock, Official Weigher and Sampler for the National Cottonseed Products Association at Savannah; also Official Chemist for National Cottonseed Products Association.

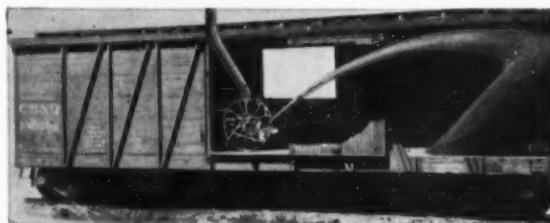
115 E. Bay Street, Savannah, Ga.



**EQUIPMENT FOR FAST, EFFICIENT LOADING OF BULK MATERIALS**

## S-A SWIVELOADER\*

Centrifugal thrower units fill box cars and bins faster and fuller at less cost per ton. Loading and trimming is handled in one operation. One man safely and easily operates the unit from outside the car—free from exposure to dust. S-A SWIVELOADER centrifugal thrower units are available in Standard Type as shown or the Hi-Type which provides for loading over three 20" grain doors.



## S-A LOADERS & PILERS

S-A Box Car Loader and Piler Centrifugal thrower units load and trim in a fraction of the time required by hand methods. One man safely and easily operates the unit from outside—free from exposure to dust.

**WRITE FOR BULLETINS 854 and 948**



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STEPHENS-ADAMSON MFG. CO.**  
421 RIDGEWAY AVENUE • AURORA, ILLINOIS  
PLANTS LOCATED IN: LOS ANGELES, CALIFORNIA  
CLARKSDALE, MISSISSIPPI • BELLEVILLE, ONTARIO

## Obituaries

**Dr. Hugh H. Bennett**, 79, widely known as the "father of soil conservation" died July 7 in North Carolina. He was head of the Soil Conservation Service from its inception to 1951.

**Joseph C. Jett**, 65, founder of the fertilizer materials concern that bears his name, and a director of Smith-Douglass, died June 29 at his Virginia Beach, Va. residence.

**Wade Hampton Logan**, 83, founder of Logan-Robinson Fertilizer Co., Charleston, S. C., died at his residence June 28.

**Boyd Robinson**, 59, owner of Robinson Manufacturing & Fertilizer Co., Grand Junction, Colo., died June 19 after a year of illness. He was credited with the discovery of the plant growth value of ferric oxide.

**John W. Sims**, 70, retired in 1955 as executive vice-president and gener-

al manager of the Farm Bureau Cooperative Association, and their fertilizer department head from 1938 to 1947, died June 18 in Columbus, O.

**Dr. Barnett Sure**, 68, retired chairman of the University of Arkansas department of agricultural chemistry, and on the faculty for 37 years, died June 3 in a Milwaukee hospital.

**W. H. "Herb" Woodard**, 59, for 15 years manager of the Armour plant in Sandusky, Ohio, and operator of fertilizer plants in St. Joseph, Mo., Omaha, Neb. and Crestline, Ohio until ill health forced his retirement in 1958, died June 23 in Sandusky.

### Ammonia Fog Kills Town's Plant Life

A leaking truck of anhydrous ammonia sent fumes over half the small town of Wyaconda, Mo. People and livestock were made ill, and all grass, shrubbery, fruit trees and some shade trees turned brown in about half the town. "It looks," said an official, "as though we had had a hard freeze."

The chief casualty was a heroic

telephone operator, who remained at her board until the fumes robbed her of a voice to work with.

### Nitrogen Solutions News To Be Sent To Dealers

Distribution of a monthly Arcadian Nitrogen Solutions news sheet by Allied Chemical Corporation to solutions dealers and members of the liquid fertilizer industry has been announced by John Waugh, director of advertising, Nitrogen Division.

"Our purpose is to pass on information that will help the people who use and sell liquid nitrogen," he explained.

He said many tradesmen have indicated the need for technical and marketing information on solutions to help improve their fertilizer operation and increase sales. "A news sheet covering the latest information about liquid nitrogen will aid the industry," Mr. Waugh pointed out.

Don't miss  
The Role of the  
Fertilizer Dealer in  
Fertilizer Sales and Use  
in next month's issue

## CF Staff-Tabulated TONNAGE REPORTS

FERTILIZER TONNAGE REPORT (in equivalent short tons) Compiled by Cooperating State Control Officials and Tabulated by COMMERCIAL FERTILIZER Staff

STATE	June		May		Jan.-Mar. Qtr.		July-December		January-June		YEAR (July-June)	
	1960	1959	1960	1959	1960	1959	1959	1958	1959	1958	1958-59	1957-58
Alabama	86,558	69,909	175,641	165,927	256,322	296,745	180,959	199,250	846,309	734,077	1,045,574	906,798
Arkansas	42,378	37,569	35,752	42,602	99,521	113,772	58,714	63,767	289,365	226,889	353,132	289,641
Georgia	226,167	231,074	414,392	471,260	154,787	175,293	297,138	294,751	1,130,998	944,618	1,425,749	1,214,147
Kentucky	-----	26,415*	-----	150,782*	137,502	176,106	108,734	99,460	491,920	435,023	583,281	523,794
Louisiana	29,603	21,173	44,488	45,047	73,649	79,260	66,744	64,152	201,642	188,409	265,794	252,601
Missouri	-----	59,592*	166,112	155,892	81,573	165,375	272,014	362,437	563,055	420,615	926,111	755,927
N. Carolina	-----	95,713*	303,065	282,240	393,130	625,933	175,533	228,055	1,468,704	1,261,685	1,696,759	1,461,131
Oklahoma	11,213	8,627	17,164	14,374	19,520	25,801	72,511	68,848	64,738	55,594	133,586	107,400
S. Carolina	53,388	47,518	96,255	102,425	267,247	385,472	104,903	134,202	756,100	615,733	890,302	732,607
Tennessee	45,157	28,621	114,932	112,907	126,524	150,897	117,275	127,116	443,602	307,182	570,718	442,899
Texas	67,187	49,904	80,575	83,994	192,926	213,084	233,410	222,800	441,851	452,327	664,651	666,128
California	(reports compiled quarterly)				350,259	317,589	457,956	453,800	803,261	679,577	1,254,028	1,121,546
Mississippi	(reports compiled quarterly)				170,706	207,139	142,576	176,371	516,917	472,791	693,288	641,262
Virginia	(reports compiled quarterly)				221,611	315,665	141,177	160,178	618,965	549,773	779,143	690,556
Indiana	(reports compiled semi-annually)						321,956	316,341	856,316	795,506	1,172,657	1,080,465
New Hampshire	(reports compiled semi-annually)						-----	4,746*	16,143	16,053	20,889	20,019
<b>TOTAL</b>	<b>561,651</b>	<b>494,095</b>	<b>1,448,376</b>	<b>1,476,678</b>	<b>2,545,277</b>	<b>3,248,131</b>	<b>2,751,605</b>	<b>3,147,899</b>	<b>9,509,886</b>	<b>8,155,852</b>	<b>12,475,662</b>	<b>10,906,901</b>

(not yet reported)

\* Omitted from column total to allow comparison with same period of current year.



## HELP WANTED

Expansion has made an opening available for an experienced salesman. Advise age, experience, and availability. Engineering degree desired, but not required. Reply confidential. Write James Madigan, Fertilizer Engineering & Equip. Co., Sturgeon Bay Rd., Green Bay, Wis.

### Agricultural Sales Representatives and Technical Service Representative

Construction of new 300/TPD plant and expansion of sales territories create need for additional Agricultural Sales Representatives and Technical Service Representative. Should have one to three years experience in sales or technical service work related to: nitrogen solutions and combination ammonia, ammonium nitrate, urea solutions, 45 and 46% urea, feed and chemical grade urea.

Please send resume' including academic background, work experience, and salary requirements to:

**R. S. Knight, Manager, Employee Relations Division**  
**SOHIO CHEMICAL COMPANY**  
Box 628 Lima, Ohio

### Agronomist

Increased plant capacity and expanded sales territories require addition of qualified agronomist to staff of our Agricultural Services Division. Primary emphasis on evaluation and development of fertilizer markets. Good training in crops, soils, and chemistry essential. Salary commensurate with background and experience.

Send resume' including major academic accomplishments, work experience, and salary requirements to:

**R. S. Knight**  
**SOHIO CHEMICAL COMPANY**  
Box 628 Lima, Ohio

## CLASSIFIED ADVERTISING

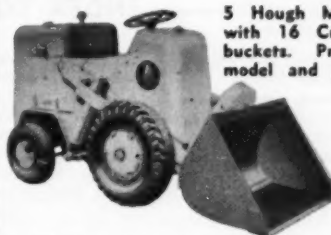
**RATES:** 50 cents a line for **Situations Wanted** ads; \$1.00 a line for **Help Wanted** ads; \$2.00 a line for all other classified advertising. Word count runs approximately eight words per line. Copy should be received by 15th of month preceding publication. **Display Classified Advertising** \$15.00 an inch; minimum space one inch.

## EQUIPMENT FOR SALE

**For Sale:** Two Simplicity 9 x 16 foot air Scrubbers, like new, \$750 each. One Omega 37-20 Weighfeeder, excellent condition, like new. Ke-Wash Fertilizer Company, Inc., Keota, Iowa.

**FOR SALE:** Davenport 8' x 60' rotary dryers. Allis-Chalmers 7' x 50' rotary cooler-dryer, 5/8" shell; Raymond 5-roller hi-side mill; Hardinge 7' x 36" stone lined conical mills; Sprout Waldron 335 cu. ft. horiz. ribbon mixer—Unused. Perry Equipment Corp., 1426 N. 6th St., Philadelphia 22, Pa.

## SURPLUS PAYLOADERS!



5 Hough Model HA Payloaders with 16 Cu. Ft. full hydraulic buckets. Pneumatic tires. Late model and guaranteed condition.

**\$1650.00**  
each

Write or call  
for information  
and photos.

3 Oliver Straight Line Loaders with full hydraulic 1-yd. buckets and pneumatic tires. Torque drive, cab protector. Exceptionally good condition.

Special  
**\$2500.00**  
each

Call  
or  
Write

**FULTON EQUIPMENT CO.**  
Phone . . . POplar 7-8606  
2235 Stewart Ave., S.W. Atlanta 15, Ga.



## Long Life Promotional Ideas from OHIO THERMOMETER!



HERE ARE A FEW of scores of advertising thermometers, rain gages, and barometers manufactured by Ohio Thermometer. There are small thermometers and big ones—up to 39 inches... tube type thermometers and the dial type, too... thermometers for indoors—thermometers for outdoors... for wall or window. They are accurate, rust-resisting, and silk screened for long life. Re-distribution is easy, thanks to their individual packaging!

Yes, nothing beats a thermometer for stretching promotional dollars, as hundreds of blue chip advertisers know. Everyone is weather conscious—everyone is thermometer conscious. *Ohio Thermometers tell the temperature and your advertising story at the same time!*

Check into thermometer advertising. Colors and copy to your specification. Special sizes and designs obtainable. Drop shipments can be arranged. Write for details.

The OHIO THERMOMETER CO., 23 Walnut St., Springfield, Ohio. Please send me your thermometer selection kit.

Name \_\_\_\_\_

Firm \_\_\_\_\_

Address \_\_\_\_\_

City & State \_\_\_\_\_

**THE OHIO THERMOMETER CO.**  
23 Walnut St., Springfield, Ohio

'USE WITH CONFIDENCE'

A  
NATURAL  
QUALITY  
PRODUCT



Airfloated:  
Bagged or Bulk  
Guaranteed  
less 1%  
free moisture

QUALITY & SERVICE SINCE 1939

### A NATURAL HIGH GRADE COLLOIDAL KAOLINITIC KAOLIN

"TAKO"—Airfloated Colloidal Natural Kaolinitic Kaolin, Fertilizer Grade, is practically a chemically pure inert natural colloid with exceptional qualities. Excels as a coating agent or conditioner of granulated or prilled high analysis fertilizers, absolutely preventing sticking or caking in production, most satisfactory in eliminating bag set. "COSTS SO LITTLE—DOES SO MUCH." Used in large tonnage year after year.

**NON-ABRASIVE**

**NON-HYGROSCOPIC**

**NON-CAKING**

**FREE FLOWING**

Shipping Point:

Plants:

Hackleburg, Alabama

**THE THOMAS ALABAMA KAOLIN COMPANY**

3412 KEN OAK ROAD, BALTIMORE 9, MARYLAND

IT WILL PAY YOU TO INVESTIGATE "TAKO" FOR YOUR REQUIREMENTS

Uniform Quality

Prompt Shipments

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**FRED ARNOLD**

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